THE AUTOMOBILE

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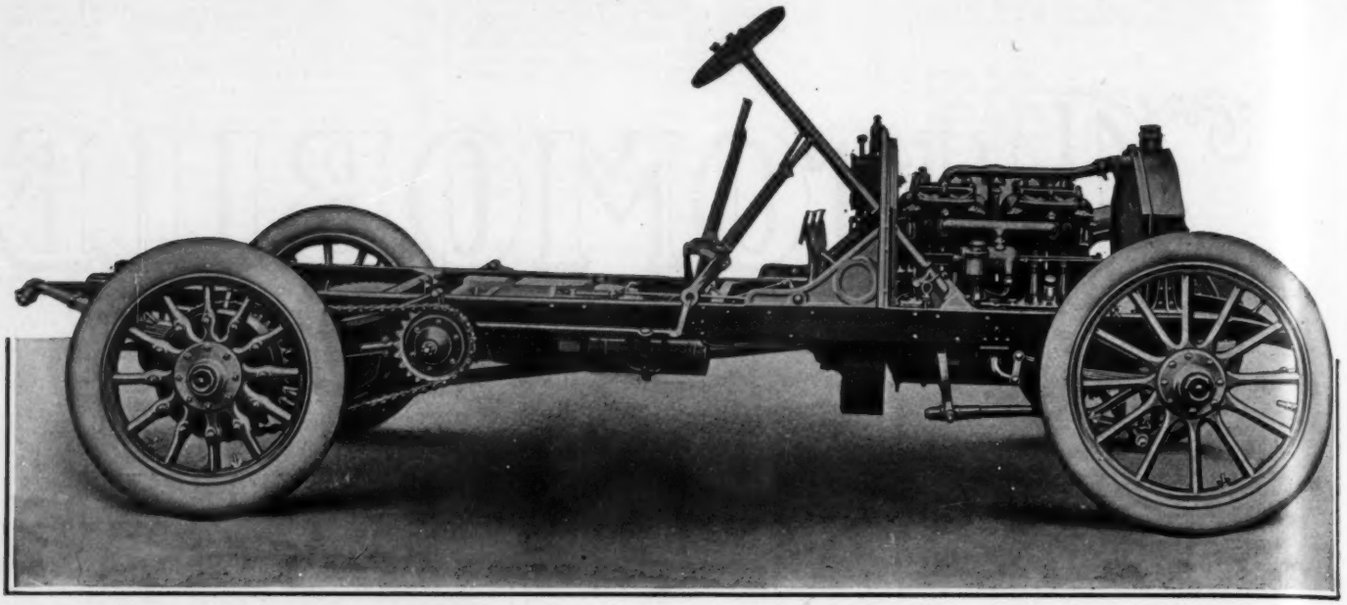
GREAT ENGINEERING CONCERNS EXHIBIT.

THE seriousness of the automobile industry could be no better exemplified than by a careful consideration of the maiden appearance at the New York shows of certain exhibitors of complete cars. While the mere matter of the total number of concerns represented by exhibits at the Garden and Armory is in itself an irrefutable proof of the growth and prosperity of the business of building automobiles, and the allied trades, this of itself does not more truly promise stability than does the appearance in the industry of a number of manufacturing establishments of the first magnitude.

Although a few great manufacturing concerns have been finding for the past few years an outlet for some small part

WHERE THE SHOWS WERE HELD—LOOKING WEST ON TWENTY-SIXTH STREET, ARMORY ON LEFT, MADISON SQUARE GARDEN IN BACKGROUND.



CHASSIS OF 30-H.P. WESTINGHOUSE-SCHMID CAR BUILT AT HAVRE, FRANCE—EXHIBITED FOR FIRST TIME IN AMERICA.

of their product in supplying materials for automobile construction, until this year the large engineering works of the country have not taken up the building of automobiles in other than along experimental lines.

There are now in the market several cars which will be manufactured by such concerns, either by subsidiary companies or under the direct supervision of the parent company. In one case the matter is for the time in abeyance, but the indications all point to an early decision favorable to the plan. In three other instances the work is well under way, and vehicles are being turned out with definite dates of delivery.

The entrance into the automobile industry of such a concern as the American Locomotive Company marks an epoch in the American history of the self-propelled vehicle, and supplemented by the E. W. Bliss Company and the company already organized by the president of the St. Louis Car Company, and possibly later the entry of the Westinghouse companies, indicates the importance of the automobile as a factor in the industrial future of the country. All of these concerns made their initial public display during the show week.

The American Locomotive Company, with ten enormous plants and inexhaustible mechanical resources at its command, is well fitted to carry out the scheme of producing work of the highest order. The plant, specially erected at Providence, R. I., for the use of the subsidiary company, the American Locomotive Automobile Company, will be supplemented by the comprehensive testing laboratory of the parent company at the Schenectady, N. Y., and such other plants as may be of material assistance in carrying out the manufacturing scheme now in hand.

The type of car to be manufactured is a reproduction in each detail of the Berliet chassis made at Lyons, France. In this mechanism the prominent characteristics are materials of the very highest grade, special steels for various parts being used throughout the construction. The make-up follows accepted practice, but many refinements of details are observed on close inspection. The chassis now in hand are the product of the Lyons house and show a four-cylinder motor with valves on opposite sides, cylinders cast in pairs, make and break ignition from gear-driven magneto, four speeds and reverse operated on the selective system, with final drive through double side chains.

The company is now importing finished parts, and the chassis will be assembled at the Providence plant. As soon as possible the parts will be manufactured in the home manufactory, duplicate tools, jigs and gauges being an important part of the equipment of the new works. The chassis will be made in its entirety in this country and on the plan of interchangeability of each part with chassis of corresponding model of the French-built Berliet.

The E. W. Bliss Company, while one of the important engineering concerns in the country, has long been famous by reason of the character of the product turned out. All the torpedoes used by the United States Navy are made in the Brooklyn city factory of this company. As the torpedo is a mechanism calling for work of the very highest order it follows that the factory equipment and the personnel must be exceptional to produce these engines of war in a manner satisfactory to the Government.

Projectiles form no inconsiderable part of the output at the tidewater plant of the concern, in Brooklyn, also highly specialized machinery and gears of all kinds, the gear-cutting department being of enormous proportions.

In such a plant, with the experience of years and an intimate knowledge of the special grades of steel which must be used in the manufacture of such articles as armor-piercing projectiles and torpedoes, it is a reasonable supposition that an effort directed towards automobile engineering will be eminently successful.

The car and chassis exhibited by Douglas Andrews, selling agent of the Bliss car in New York, is designed along accepted lines, and possesses no radical departure from typical construction.

The use of highest grades of nickel and chrome steel are general throughout the car, and the greatest care has been used in the proportioning of the gears and other parts. The transmission system provides a drive through but one pair of gears for first, second and third speeds, with fourth speed direct, two sets of bevel gears and pinions being fitted to the shafts in the transmission.

The engagement of speeds is progressive, the change speed lever moving over a notched quadrant from reverse at the rear to fourth speed forward. Final drive is by side chains. But one model has been decided on, a four-cylinder, 30-horsepower chassis priced at $5,000. The complete car at the Armory was provided with a body by Demarest, and the finish in all details carried out with taste and judgment.

George J. Kobusch, president of the St. Louis Car Company, by reason of his intimate acquaintance with transportation problems, is eminently fitted to head the organization of a company formed for the purpose of reproducing the well-known Mors car. The St. Louis Car Company has been established for two decades as one of the largest manufactories in the country of coaches for steam railways and cars for suburban electric service. The company's product in New York City is well represented by about 230 cars, now in use in the Subways, and more than 700 cars in the

suburban service out of New York. A considerable department of the business has been the manufacture of pressed steel cars, the output being five complete cars a day throughout the year. No less than 3,200 men are employed in the great works, and the new buildings erected for the automobile branch will give employment to more than 400.

In the selection of a type the Mors was chosen and suitable arrangements made with the Société Anonyme Mors for the exact reproduction of the various models made by this famous French house. Each car will be an exact duplicate of the foreign machine of a corresponding model, the metric measurement system being employed, and not only shop drawings but duplicate parts will be furnished by the Mors company for the guidance of the St. Louis concern.

The car is so well known that a description is hardly necessary, though it may be said to contain typical features such as sliding-gear change speed with direct drive on fourth speed, controlled by a progressive lever. The drive on all speeds but fourth is through a pair of gears and a bevel gear and pinion on the secondary shaft, a second bevel set driving from the first shaft on the engagement of high speed.

Motors will be built with cylinders cast in pairs for the higher powers and with individual cylinders for the two smaller engines. The Mors practice of offsetting the cylinders will be, of course, followed in the Kobusch car.

As an indication of the progress made in the new plant, it may be stated that some fifty odd chassis are in process of assembly, with over a hundred in prospect and under way. The output for the year will be more than 200 cars, and in the lot will be three regular models, ranging from 20 to 50 horsepower. The capacity of the plant will be increased as the market for cars of this quality may demand.

Another great corporation, and in some ways the most remarkable concern to seriously consider the automobile as a mechanism worthy of a prominent place in its product, is the Westinghouse companies. Already the French branch, the Société Anonyme Westinghouse, of Havre, with a splendidly equipped plant for the manufacture of electrical machinery, has been turning out chassis for some time after designs by Albert Schmid, director and consulting engineer of this allied company.

At the Armory show a beautifully finished 30 horsepower chassis was on view and attracted the serious attention of the engineer and the tradesman. The mechanical features involved, while not of startling novelty and along the lines of established practice, are carried out with the greatest skill, with here and there a decided touch of originality. The water-cooling of the brakes and the carbureter are Westinghouse ideas and the limiting governor is an uncommon attachment.

In the selection of metals entering into the construction the widest possible range has been given to a choice, each vital part of the mechanism being made from such steel alloys as seemed best fitted to the particular work in hand, nickel-steel of various grades and nickel and chromium alloys being used without reference to initial cost. The chassis shown is the production, in its entirety, of the French house, and is sold for 25,000 francs f.o.b. at Havre.

Whether or not the parent company, with its principal works at Pittsburg, will undertake the manufacture of a duplicate chassis and other models is as yet a matter under consideration, but the probabilities all point that way. If the decision is favorable, it will mean that the entire available resources of the vast Westinghouse interests will be at the disposal of the automobile branch of the business, and with its great magnitude, splendid organization and unified spirit, the possibilities of the company will be well-nigh limitless.

Another significant fact brought out prominently at the recent shows is the added attention given to the automobile by such great American establishments as the

AMERICAN MORS TOURING CAR BUILT BY THE KOBUSCH AUTOMOBILE CO. AND SHOWN FOR THE FIRST TIME IN NEW YORK.

Bethlehem Steel Co., the Midvale Steel Co., the William Cramp & Sons Ship and Engine Building Co., the Carpenter Steel Co., and the foreign house of Krupp.

While each of these companies has for some time been supplying a large number of automobile manufacturers with a variety of materials, this is the first year that has seen comprehensive exhibits made at the automobile shows. The firm of Krupp, at Essen-Ruhr, has probably furnished more automobile parts and materials to Continental manufacturers than all the other producers of Europe, and the business is so well established as a branch department of the works that no element of novelty enters into consideration save that it is the maiden appearance of the company as an exhibitor at an automobile American show. The condition in this country is not quite the same as in Europe, the American automobile manufacturer only recently demanding steels and materials of the highest order in such considerable quantities as would justify the largest producers in making a special effort to cater to this department of the business.

That such concerns as the Midvale, Bethlehem, and Carpenter steel companies are for the first time represented with comprehensive exhibits at automobile exhibitions, indicates their appreciation of the growing demand in this country for steels of the highest degree of excellence for the construction of automobiles.

This appreciation could only come with the belief in the stability and importance of the automobile industry, and in the earnest endeavor of the manufacturer to bring his product to the highest possible degree of excellence. Regarded in such a light, it is a hopeful and significant sign of the growth and permanence of the self-propelled vehicle.

Some Features of Technical Interest.

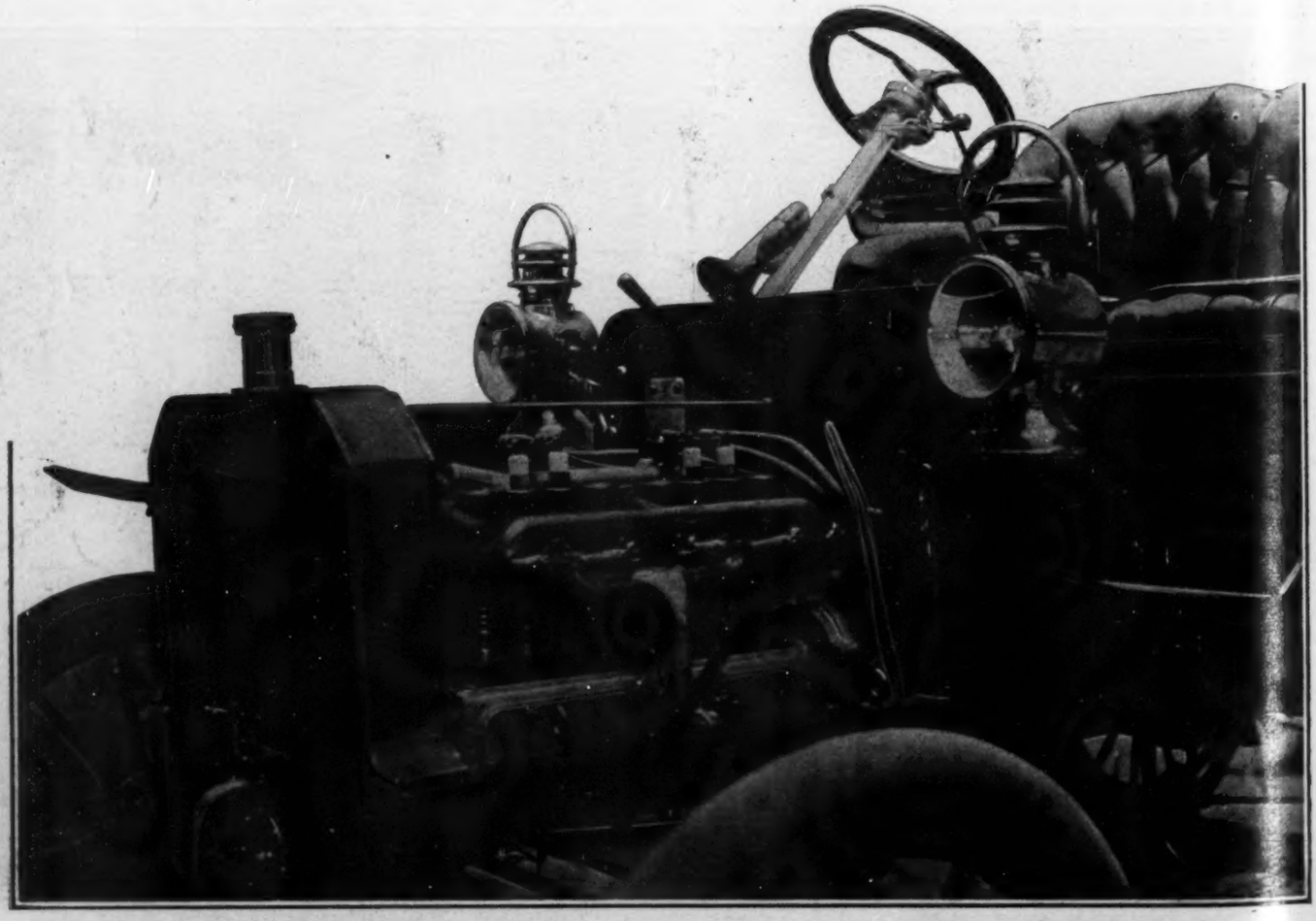
THE first nervous look for something new did not find many points of attraction, but the next couple of rounds through the Garden and Armory made it clear that a systematic search was the only method of obtaining valuable information. Taking one car detail after the other, the comparison brought forth such a vastness of interesting material that the investigation had at once to be confined to a limited number of details. It would take months, and not one week, to digest the tremendous amount of valuable improvements which, hidden to the casual observer, were stored within the compass of rather similar exteriors.

It is therefore impossible to do justice to the hundreds of ingenious details and their originators without the compilation of an indexed show dictionary.

It is natural that the cleverly heralded $500 four-cylinder motor-in-front Ford runabout proved a strong magnet for the knowing and unknowing. To do justice to this commercial novelty is not an easy proposition, for two reasons: First, it was extremely difficult to get at the details of the construction, so great was the crowd which surrounded the car from morning until night; and secondly, there are no acknowledged performances available to form a basis of criticism.

As far as the general design is concerned, it must be frankly stated that it appears to be the product of a wide and practical experience as well as the ability to combine simplicity with effectiveness. On some of the details the tendency to produce a light car is, at first sight, of a rather startling character, which shows, however, on closer examination, good mechanical reasoning.

The frame is of tubular truss design, axles and steering knuckles probably of excellent



INLET SIDE OF ENGINE OF THE NEW FORD FOUR-CYLINDER RUNABOUT, THE FEATURE OF THE ARMORY SHOW.

HARMON EXHIBIT IN THE ARMORY SHOW, WITH DEMONSTRATION CHASSIS MOUNTED ON BLOCKS TO SHOW FLEXIBILITY OF SUSPENSION.

material, judging from their dimensions, and the hanging of motor and transmission simplicity itself. The steering device seems, at first, direct, until the information is gleaned that a little box right under the steering wheel contains the induction gearing, which seems a novel idea,, surprising in the fact that it was possible to design it with such novel compactness. The change speed gear is of the planetary type, operated by a side lever, and is directly connected with the motor shaft without the interposition of a clutch under separate pedal control.

Lubrication has been provided for all essential working parts; splash system for the motor under the supply of an Essex exhaust force feed oiler. A regular Splitdorf coil is seen on the dash. A radiator, the product of a well-known firm, forms the front of the car. The rear hub brakes are operated by a foot pedal, the mate of which engages a transmission brake, while a third pedal produces reverse motion.

The outside appearance of the car makes a pleasing standard impression. The accessories visible on the outside are of known value, and the demonstration ride of the usual favorable four-cylinder car impression.

These general characteristics of a car of such attractive appearance lead to the conclusion, that good material must have been used to secure lightness and retain strength and that only the vast number of cars to be produced and a small margin of expected profit enabled the maker to offer it for a price which is startling when compared with the general specification of the car.

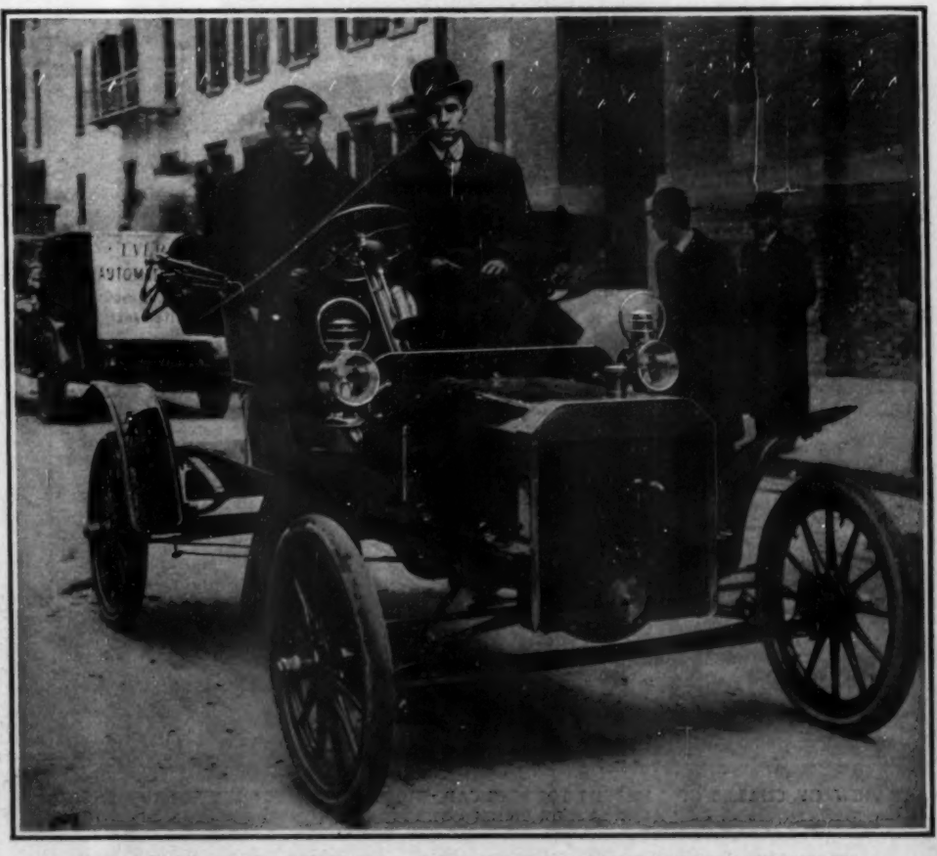
The car of direct opposite characteristic is the new Northern. Appearing without any warning, without unusual valuation and departing in many important points from standard lines of construction, it shows in almost every vital part originality combined with ample provisions for certainty of operation.

To make a quadruple cylinder casting in one piece with the crankcase is a decided novelty in automobile construction and must, without inspection of internal arrangement and consideration of machining problems, contain decided points of advantage, especially in regard to stiffness of the supports of working parts.

The special arrangement of the spark plugs screwed into special fixtures forming an auxiliary combustion chamber is uncommon and of merit. The arrangement of a flywheel of unusual large diameter makes for the quietness of the engine, acting at the same time as a fan and vacuum destroyer at the rear end of the car, all showing a broad study of automobile problems.

The entire control scheme is also of decided novelty, as the gear box (a unit either with the motor or rear axle differential casing respectively in the two models shown) is actuated by a hand wheel superimposed on the steering wheel for going ahead and for the reverse by a foot slide protruding from a slot in the base of the steering column.

The throttle lever located under the steering wheel also actuates the pneumatic clutch, which in itself, as well as the air brakes, is not only rather an exception in automobile engineering, but also original in design. The ratchet starting device, the use of the two-to-one gear as a circulating pump, are also of unusual application. Space prevents not only a complete discussion of all the novel features of this car, but even a listing of them. The general characteristics, however, indicate a tendency toward simplification, safety of operation by numerous interlocking devices, and the bold arrangement of engine and power drive in one straight line to the rear axle with the interposition of only one universal joint. In general the chassis makes the impression of simplicity and efficiency.



DEMONSTRATING THE NEW FORD FOUR-CYLINDER MOTOR-IN-FRONT RUNABOUT.

The Northern car and the Ford runabout are probably the constructions of special interest about which a final judgment would be premature at present.

It is different with the productions in the two-cycle field. It seems reasonable to expect that the example set by the four-cylinder Elmore and three-cylinder Oldsmobile two-cycle engines will bring again to the front this unjustly neglected possibility of automobile motor construction.

This renaissance of a sound principle deserves as much attention as the development of the air-cooled car, which shows an increasing number of representative makes from year to year.

The thorough design of the Knox four-cylinder, vertical motor-in-front chassis, with its double-bevel gear transmission construction, is a fair example of the importance which the air-cooled car has assumed. This year's cars show a state of perfection that is the legitimate outcome of long, practical road experience.

Of cars fitted with air-cooled motors the Frayer-Miller, employing forced draught in cylinder jackets, was a constant center of interest, though of course no longer a novelty.

A five-cylinder, air-cooled motor (the Carey), revolving around its crankshaft, was the only decidedly novel construction in the air-cooled line, interesting, especially, for the fact that the manufacturer claims to have overcome the main difficulty with such motors in preventing the running dry of bearings by the centrifugal motion of the oil under high motor speed. It would exceed the limits of this article to go into the details of simplification possible with such construction, and only the absence of fan or blower, muffler and camshafts may be specially mentioned.

The well-known arrangement of the inclined cylinders in the Marmon air-cooled car has again attracted special attention by its main feature of providing for an ample body of air and free passage of the air all around the cylinders, not always a characteristic of air-cooled, four-cylinder motors with the fore-and-aft arrangement of cylinders.

The peculiar suspension system of this car having been recently discussed in detail in these pages, its mere mention may be sufficient. In the Armory the chassis was so mounted that its flexibility was easily demonstrated to the visitor, and it seemed to make a considerable impression.

The new Aerocar was received with favorable interest by the critical, its merits being acknowledged from the fact that it embodies the well-known Reeves air-cooled motor, and its other elements are of well-known efficiency. It will be interesting to watch developments in this rapidly-moving enterprise.

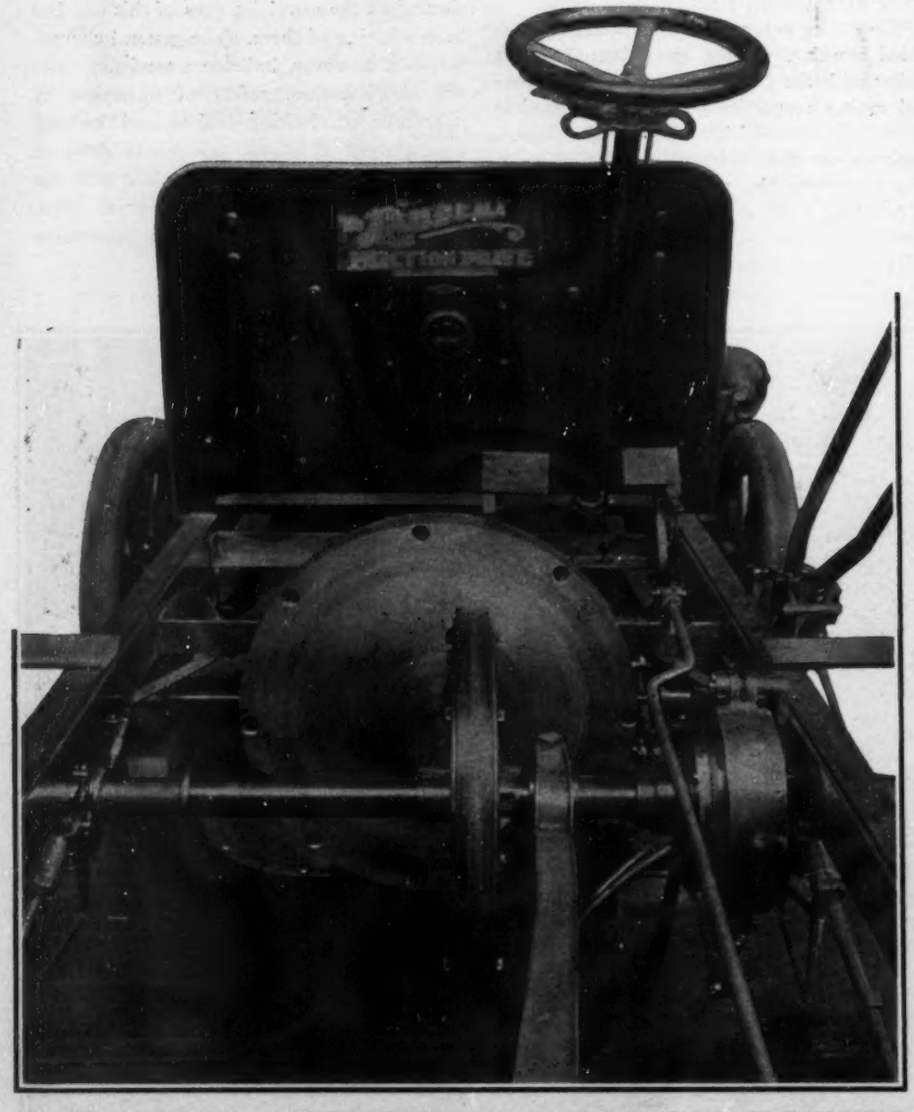
In combination with air-cooled motors the Orient friction drive buckboard apparently offers neat appearance, combined with low price. In this construction a friction drive of proper design and material is specially suitable on account of the small weight of the car.

The possibilities of the friction drive were lucidly presented to always a considerable group of spectators at the stand of the Lambert automobile, which construction naturally showed an increase of dimensions adequate to the weight of the car. Aluminum composition and paper friction surfaces are employed for the transmission disks. In practical operation both vehicles give only a limited number of speeds, as indicated by the notches on the speed-lever sectors. These notches are probably used to prevent any creeping of the sliding wheel.

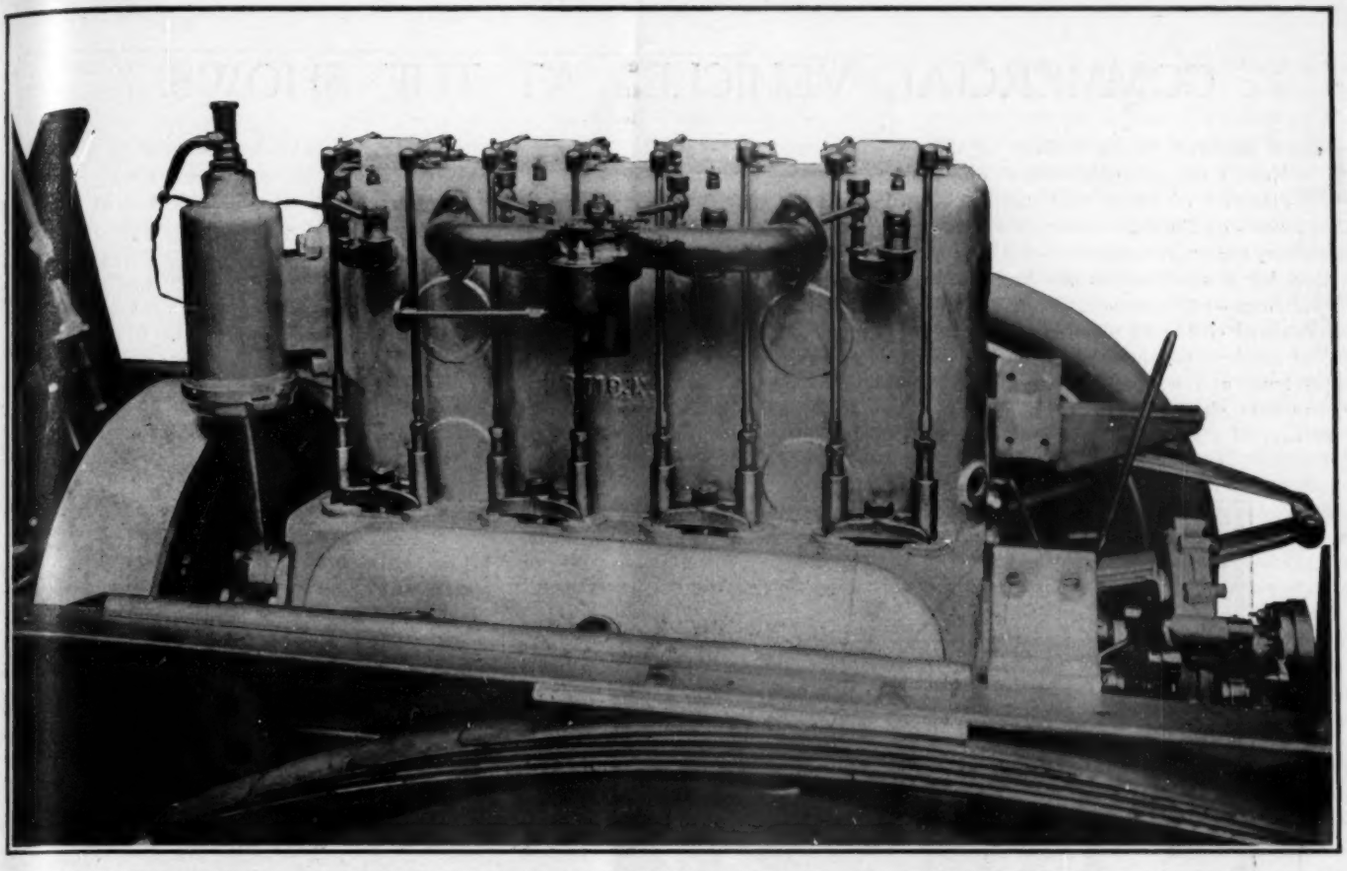
Other friction systems shown were the Windsor and the Gearless transmissions, in the Armory. The practical operation of these systems will be watched with great interest, for it is undeniable that an efficient friction drive would provide the ideal form of change speed construction for automobiles, and especially for commercial vehicles.

Regarding other details of car construction, the retention of armored wood frames in the Spyker, Panhard, C.G.V., Electrette, Lansden truck, and Pope-Hartford cars seems to indicate a desire to lighten car frames and to increase their elasticity at the same time.

The old question as to whether the driver of an automobile should sit on the right-hand side or the left finds illustration in the fact that a majority of the commercial cars have the steering wheel on the left-hand side. This position seems to be the accepted one for convenience in operating the car and for best observing the possibilities of making progress in a crowded thoroughfare. In view of the existing road laws in this country it seems logical to place the steering wheel on the left, just as location on the right-hand side seems logical for vehicles in the British Isles, where the custom in passing is the reverse.

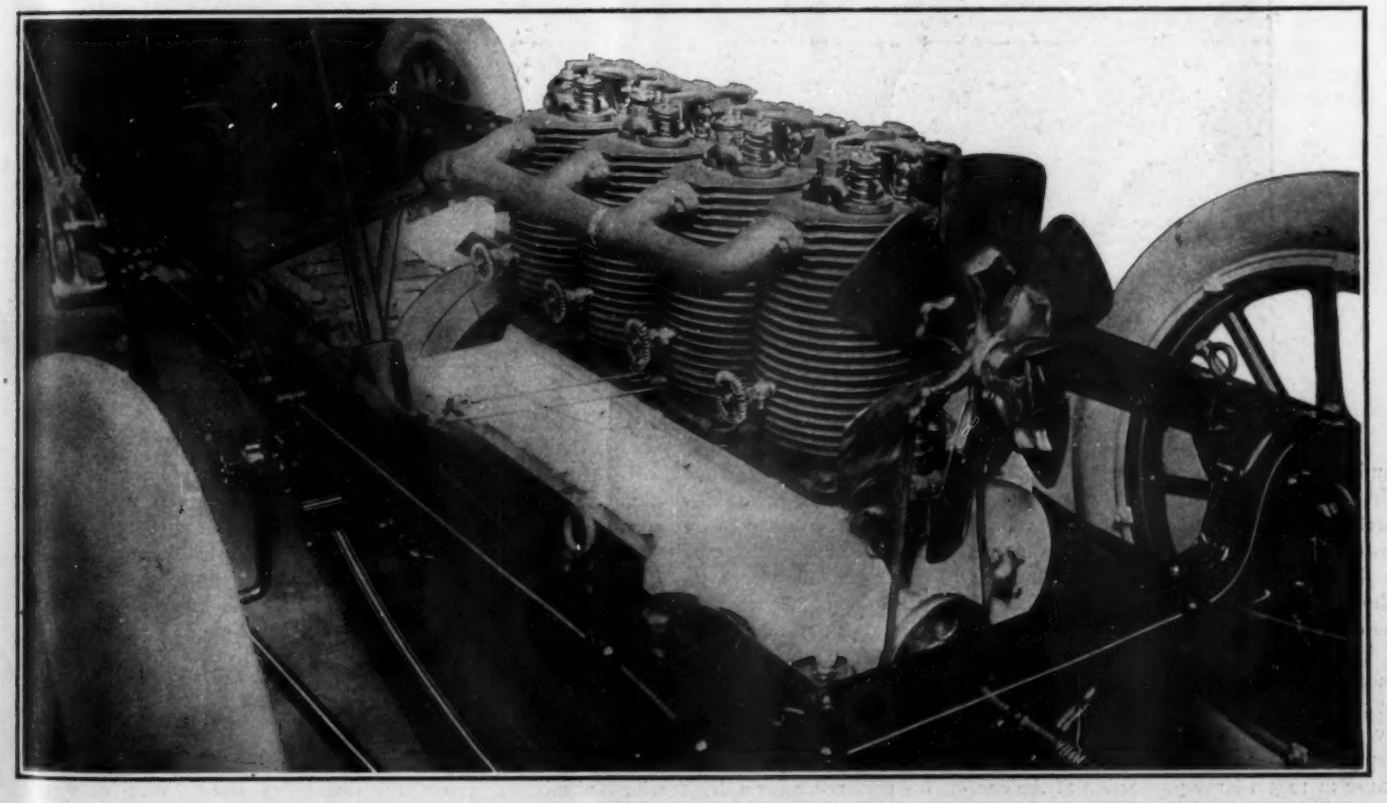


PART VIEW OF CHASSIS OF LAMBERT TOURING CAR, SHOWING FRICTION DRIVE FROM ENGINE SHAFT TO SIDE CHAIN COUNTERSHAFT



MOTOR OF THE NEW NORTHERN TOURING CAR EMBODYING MANY NOVEL FEATURES—ONE OF THE MOST ATTRACTIVE EXHIBITS IN THE GARDEN SHOW.

Note:—Cylinders and crank case are in one casting. Air pump on left of engine supplies compressed air to operate clutch and brakes. Spark plugs are attached to casting forming supplementary combustion chamber. Two-to-one gears are used as water pump.



FRONT END OF CHASSIS OF THE AEROCAR SHOWING THE FOUR-CYLINDER REEVES AIR-COOLED MOTOR. A NEW EXHIBIT SHOWN FOR THE FIRST TIME IN NEW YORK AT THE ARMORY

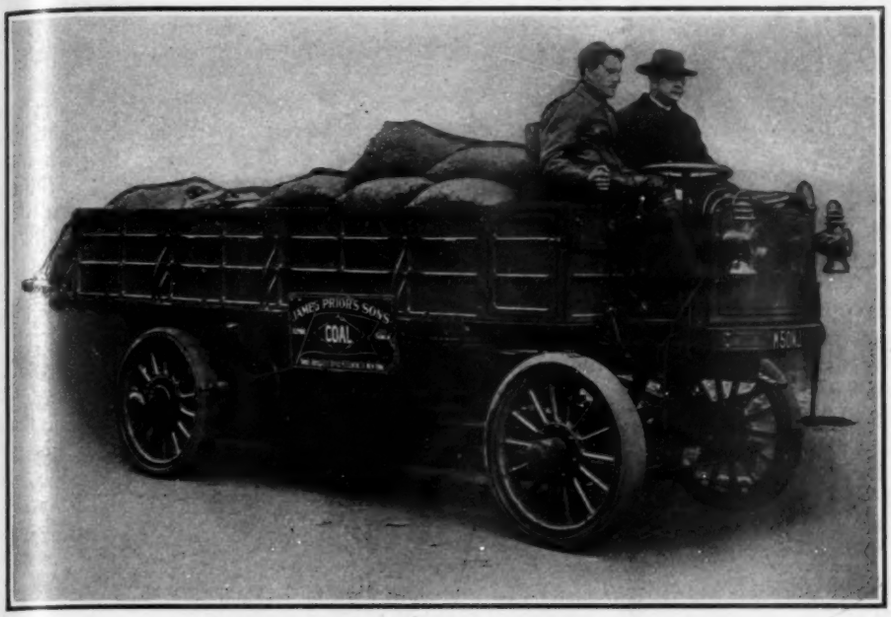
COMMERCIAL VEHICLES AT THE SHOWS.

TO a majority of the visitors to the New York automobile shows, to a majority of those who read published reports of the shows and to the "general public" the great exposition—for it was in effect but a single exposition housed in two buildings—was arranged primarily for and consisted chiefly of pleasure cars. In point of numbers and in spectacular display this is true, and it is also true that the pleasure cars shown were far in advance of the cars of a year ago, both in numbers and in mechanical excellence. It is not putting the case too strongly, however, to assert that the exhibit of commercial vehicles was of greater real importance and held a deeper significance than anything else shown. A few facts in this connection will be of interest.

There were about a hundred per cent. more exhibitors of commercial automobiles at the 1906 show than at the 1905 show; but even this great increase does not adequately represent the true status of the matter, because in 1905 a large proportion of the commercial cars, so-called, consisted of pleasure car chassis carrying light delivery bodies, while in 1906 the exhibitors of commercial cars are, almost without exception, builders of vehicles designed wholly and exclusively with a view to carrying the burdens of commerce. These facts speak for themselves, and hardly need the backing supplied by the several manufacturers who stated that the combination of pleasure car and delivery wagon was a failure, though the experiment was inevitable and the experience gained was essential in producing cars properly fitted to meet the demands of commercial work, so different from the calls made on pleasure cars. The beneficial effects of hard experience are shown on every hand, in the massive proportioning of parts, the increase of power, the decrease of speed and the banishment, from the heavier classes at least, of the mirror-like finishes seen on pleasure cars. The fact that no hired driver will ever handle a truck in the way an automobilist handles his own pleasure car has received due attention—so much so, in fact, that one manufacturer emphatically voices his preference for a driver who is absolutely ignorant of the working of the motor, who knows nothing whatever of making adjustments, but who knows how to pull the levers, press the pedals and steer. This is, of course, an extreme view, and its diametric opposite is entertained by the manufacturer who wants a factory-trained expert on each car, and is willing to go to considerable trouble to train men for such work. The first holds that a man who does not know the difference between the spark plug and the gasoline tank, or between the armature shaft and the battery terminals, cannot be tempted to "adjust" things until they refuse to function, but can readily learn to handle the controlling levers intelligently and will do it much more cheaply than an expert who could be trusted among the machinery; also, that the non-mechanical man is easy to find, while the expert is a luxury. It is argued that if the car is properly built it will more than pay to take it to an expert repairman on the few occasions when attention is required.

The advocate of expert drivers believes that it pays to employ trained men, able to meet any emergency and do most of their own adjusting and repairing. Another argument is that eventually practically all

INTERIOR OF ROOM IN ARMORY FITTED BY WESTINGHOUSE COMPANIES FOR EXHIBITION OF CAR CHASSIS, MERCURY VAPOR LAMPS AND CONVERTERS, AND AIR COMPRESSOR FOR INFLATING TIRES.



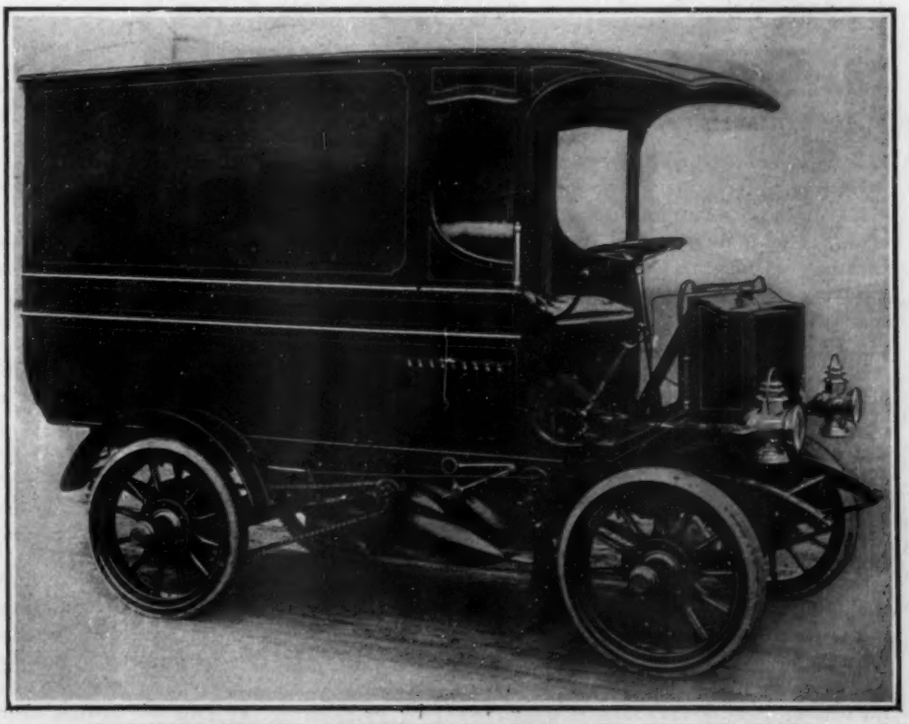
ATLAS THREE-TON GASOLINE TRUCK WITH ENGINE ON REAR AXLE.

motor truck drivers will become comparatively expert, just as the average horse truck driver of to-day knows enough to take intelligent care of his horses; and that the sooner the educative process is commenced, the better. As a matter of fact, the majority of manufacturers, especially of gasoline trucks, incline toward the latter attitude and make their trucks as substantial, simple and easily understood as possible, while reducing the necessity for adjustment to the minimum. These questions apply to electric vehicles in a lesser degree, for the battery, the source of the great majority of electric vehicle troubles, is necessarily always handled by specialists, and the mechanism presents little or no opportunity or temptation for the driver to "tinker."

The attitude of the truck-using public toward the power commercial vehicle is such as to be exceedingly encouraging to the builder. Numerous tentative purchases have been made in the past, and in not a few cases the results have been below expectations. The business man has seen, however, the possibilities of the practical vehicle, and is ready to try again, knowing that improvements are being made constantly. In many cases the experiment has proved a success and the business man and those who have watched him are ready to purchase more trucks, especially in view of the likelihood of obtaining better results from improved vehicles.

If the motor truck was merely a means for advertising a business; if it was merely a little more convenient, or a little quicker than the horse-drawn truck; if it merely did the same work at about the same cost, the business man would not consider its purchase for a moment. The automobile builder's proposition, however, is that the motor truck is a saver of money, and a proposition to save money is the surest way to sell trucks. The manufacturer has reached a stage in the development of his machines where he has a good deal of well-founded confidence in their ability to do what they are built to do, and in several instances the business man is offered a guarantee that the motor trucks will do a certain per cent. more work in a given time than an equal number of horse-drawn trucks, with a certain percentage of saving. A proposition of this kind coming from a responsible concern cannot pass unnoticed, for it is a matter of dollars and cents—what the average man is in business for. If a truck builder can demonstrate the truth of his assertions in actual work, orders are assured. A careful survey of the situation would seem to show that motor truck builders are "making good" in so many instances that the increased number of exhibits, the improved quality of the machines, the increasing demand for them and the increasing numbers seen on the streets of our large cities are the logical results.

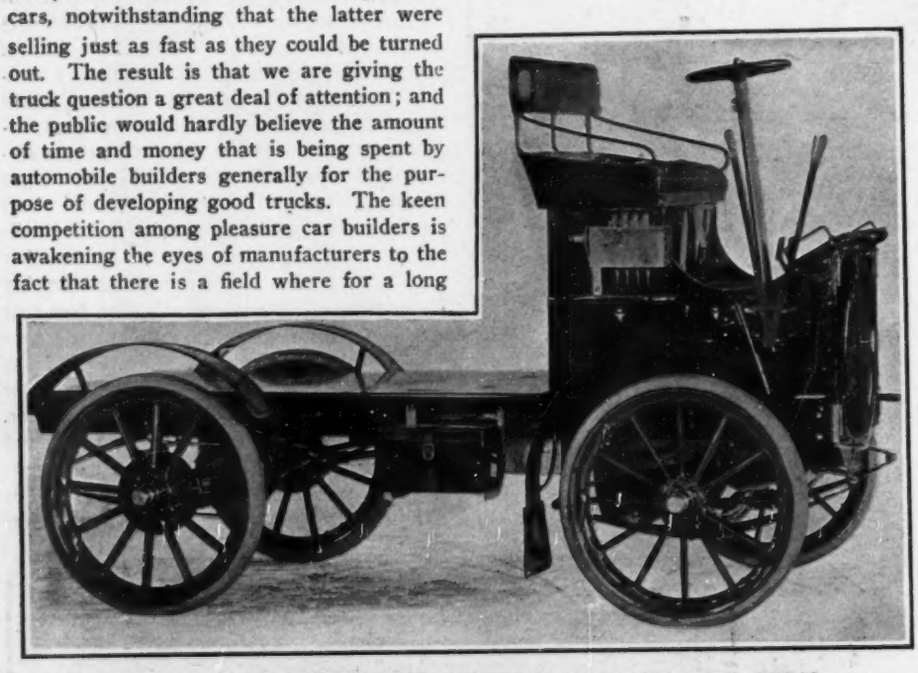
Automobile stages and other passenger-carrying automobiles for public service are somewhat peculiarly situated. Though their reliability and practicability have frequently been proved, they are not usually profitable when brought into direct competition with steam railroads and trolley lines in localities where there is much travel, while localities where no such competition exists are, as a rule, sparsely inhabited and not heavily traveled. Under certain conditions, however, automobile passenger service is very successful, as has been conclusively proved. For instance, passenger and light freight work is profitable where it is possible to secure the combined business of several small villages, all at a distance from a railroad station and none reached by a trolley line. Newly opened territory where railroads are scarce offers exceptional opportunities for motor stage work; the sightseeing automobiles that ply in the larger cities are familiar to the public, and short routes in mountainous districts, where railroads are impracticable, are, in a number of cases, covered by automobiles carrying both freight and passengers. The fact that the mails are entrusted to automobile stages in many instances is an indication of the reliability of the motor vehicle. Passenger work is nearly always of special character, requiring special arrangements of car and body; the machines usually consist of regular truck chassis fitted with passenger bodies and, perhaps, geared to a rather higher



OLDSMOBILE COVERED DELIVERY WAGON WITH 16-H.P. GASOLINE MOTOR.

speed than is considered advisable for freight work.

Manufacturers of commercial cars are unanimous in the opinion that the field is enormous, and that the concerns now building reliable trucks will in a short time be unable to meet the demand. The representative of a concern which has only recently placed a commercial machine on the market expressed the opinion that the wisest manufacturers are those who early commenced work along commercial lines and were prepared to enter the field with well-tried vehicles. "My firm," he said, "did not think very seriously of entering the commercial field until a couple of seasons' use of a truck for its own freight work brought the conviction that it was only necessary to show business men what a good motor truck would do to create a demand that meant vastly more than the demand for pleasure cars, notwithstanding that the latter were selling just as fast as they could be turned out. The result is that we are giving the truck question a great deal of attention; and the public would hardly believe the amount of time and money that is being spent by automobile builders generally for the purpose of developing good trucks. The keen competition among pleasure car builders is awakening the eyes of manufacturers to the fact that there is a field where for a long time there will be plenty of room for everyone who has the right vehicle."



FRANKLIN ONE-TON TRUCK WITH 4-CYLINDER, AIR-COOLED, 12-H.P. MOTOR.

So far the question of motive power has not been touched upon, commercial cars being referred to as a class. This year the gasoline truck has come into prominence with a rapidity that is astonishing, while electric vehicles are widening their field of usefulness continually. Steam for commercial work does not find the favor in this country that it does abroad, and no commercial cars propelled by steam engines were seen at the New York show. While there is naturally much rivalry between the manufacturers of electric and gasoline cars, there is a distinct and gratifying absence of inclination to belittle one another's cars; this is doubtless due in a large measure to the realization of the fact that there is more to be gained by pointing out the good qualities of one's own machine than by abusing the cars of other makers; and to the knowledge of the fact that no one type of machine possesses a monopoly of good points. Builders of electric trucks cheerfully admit that for long-distance work and for service where it is difficult or impracticable to obtain direct current, the gasoline car is superior; while builders of gasoline cars are usually willing to acknowledge the advantages of the electric car for house-to-house delivery or service where the vehicle must make stops at short intervals.

Again, the builders of electric commercial cars feel that this class of machine has earned for itself an undisputed position and a reputation for usefulness that cannot be denied; while the gasoline car builder, knowing the developed qualities and the latent possibilities of his car, is not only hopeful, but confident of success.

As in the case of pleasure cars, various types of motors are used, and all seem to meet the requirements. Air-cooling and water-cooling are each used, examples of both types being prominent in actual service. Engines are built with one, two or four cylinders and are placed with cylinders horizontal and vertical, some under a hood in front, some under the driver's seat and some under the body and even on the rear axle, the latter form being adopted by a prominent concern. There is no uniformity of practice in transmission gears, clutches or driving systems. Side-chain drive is found on heavy and light vehicles alike, while live rear axles are found not only on light delivery wagons, but on one of the heaviest of the gasoline trucks.

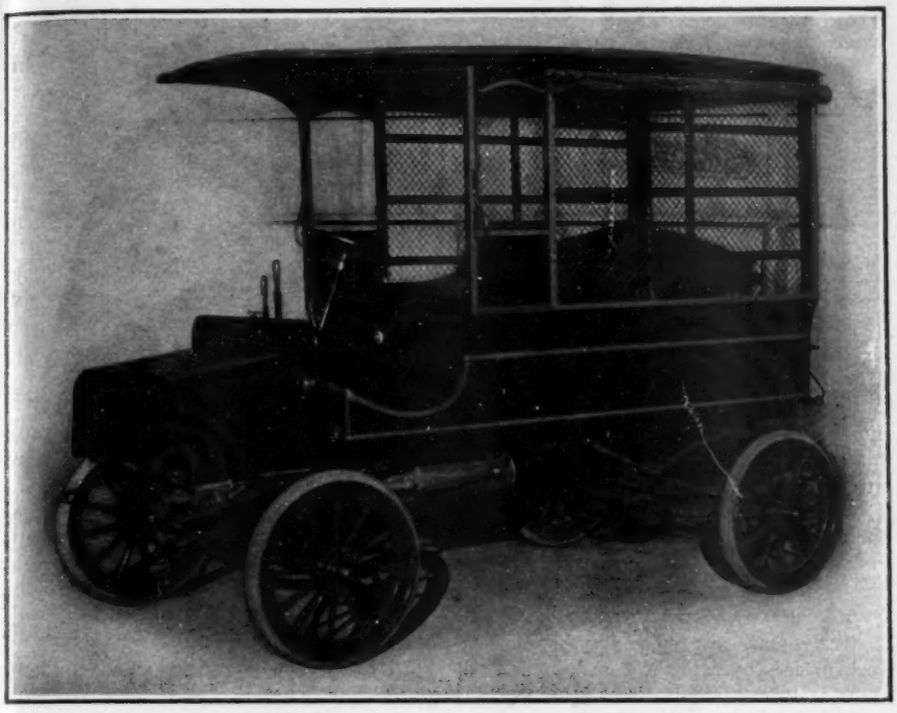
In point of carrying capacity the electric trucks are in the lead, so far as the show indicated. Several five-ton electric trucks were exhibited, while there was but one gasoline car of that rated capacity, and that was shown outside, demonstrating its ability by carrying five tons of pig-iron about the streets.

Many of the commercial cars exhibited have been described and illustrated in previous issues of THE AUTOMOBILE. The leading and characteristic features are here given, however, and will give the reader an excellent idea of prevailing practice in commercial cars on this side of the Atlantic. It is rather interesting to note that only American commercial cars were exhibited, the commercial field not being cultivated by foreign builders, whose attention, so far as this country is concerned, is centered on the pleasure car.

The Packard Motor Car Company, of Detroit, Mich., manufactures only one commercial chassis which, however, can be fitted with any style of body desired. This machine has a carrying capacity of 3,000 pounds and is equipped with a double-cylinder, vertical water-cooled motor rated at 14 horsepower placed under the driver's seat. The motor is of the same type as the Packard touring car motor, though having only half the number of cylinders, and drives through an internal expanding clutch, three-speed sliding gear transmission and side chains to the rear wheels which are mounted on a solid rear axle made of two-inch square forged steel. Maximum speed, 12 miles an hour. Ignition is by jump spark, with a storage battery supplying the current. The regular touring car carbureter is used. The frame is of armored hard wood and is carried on semi-elliptic springs, the rear springs being three in number and of the platform type. Wheels are 34 inches in diameter in the rear and 32 inches in the front, and run on roller bearings; the steering knuckles turn in ball bearings. Balls are also used in the transmission. Wheelbase, 97 1-2 inches; tread standard. Tires are of solid rubber, 3 1-2 inches in diameter. The brake system is the same as on the Packard touring cars, and consists of a drum on each rear hub, with an internal expanding ring and an external contacting band on each drum, the exterior brakes being used for regular service and the internal rings for emergency work. The radiator is tubular and is placed at the front of the car, below the dash; the total water capacity is seven gallons. Eight gallons of gasoline are carried; the manufacturers state that in actual service, with loads varying from full capacity to nothing, the truck averages ten miles to a gallon, giving a radius of about 80 miles on a tank of gasoline.

Requirements vary so much that no attempt is made to make any one type of body standard; the truck is regularly supplied with no body, but merely a driver's seat. Designs can be furnished and bodies built, however, in many styles, or the purchaser can have a body built to suit his own special needs.

A 2,000 pounds capacity delivery wagon with gasoline motor was exhibited by the Olds Motor Works, of Lansing, Mich.; though the car is conservatively rated at one ton the manufacturers state that it will



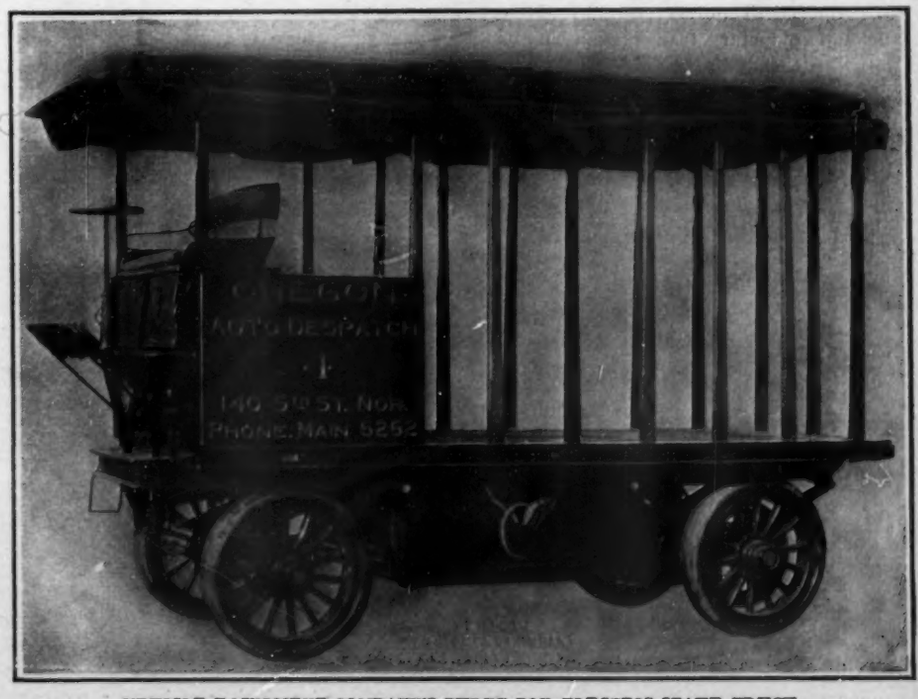
LOGAN 1,500-POUND DELIVERY WAGON SHOWN IN OPERATION IN THE STREET.

handle a 3,000-pound load without difficulty; the weight of the car is 3,500 pounds. The motor is rated at 16 horsepower and has two vertical water-cooled cylinders placed under the driver's seat with the shaft extending transversely. Drive is by chain from the motor to a countershaft carrying the two-speed planetary transmission, and from the countershaft to the rear wheels by side chains, the rear axle being solid. Maximum speed, about 18 miles an hour. The frame is of pressed steel; wood sills for the body are carried above it on steel brackets. Wheelbase is 110 inches and tread standard; wheels are all 34 inches in diameter and are fitted with 4-inch solid rubber tires. The radiator is tubular and is carried in front of the dash; water capacity, 10 gallons. The exhibit consisted of a chassis without body, a closed delivery wagon with rear doors and an express wagon with top and side curtains, all on the same type of chassis.

One of the recent arrivals in the commercial field is the H. H. Franklin Manufacturing Company, of Syracuse, N. Y. This concern exhibited a gasoline truck equipped with a 12-horsepower, air-cooled motor of the regular Franklin type, placed vertically under the driver's seat with the shaft fore-and-aft. The car weighs 1,400 pounds, and, notwithstanding its lightness, is rated as having a carrying capacity of 2,000 pounds. Drive is through multiple disk clutch, two-speed sliding gear transmission, shaft and bevel gears to the live rear axle. The car is geared to a high speed, considering its carrying capacity, being capable of runnig 20 miles an hour on the high gear. The rear axle runs on Hess-Bright ball bearings; the front axle, which is tubular, on roller bearings; the engine bearings are of special babbitt castings made in the Franklin factory for this work; the transmission runs in ball bearings. Five bearings support the crankshaft. The framing is of wood and the springs are full elliptics and 40 inches long; wheels are 32 inches in diameter with 3-inch rear tires and 2 1-2-inch front tires, solid rubber. Wheelbase, 72 inches; tread, 54 inches.

The motor, under the driver's seat and the footboard, is so installed that it is very accessible. A large centrally divided door in the front of the motor compartment is nearly the whole width of the compartment, and smaller doors at the sides and back are also provided. The front doors are mainly of metal grill work, allowing air to reach the motor. The transmission and clutch are reached through a trap-door in the platform, just back of the seat, and the footboard is also removable. The loading platform is regularly made six feet long, but can be made considerably longer on order, provided the normal loading capacity of the car is not exceeded. The platform is 40 inches wide. The motor is controlled through a governor acting on the throttle; the carbureter is automatic.

Prominent among the builders of commercial cars propelled by air-cooled motors is the Knox Automobile Co., of Springfield, Mass., whose vehicles are of massive design and strong construction. The Knox commercial cars embody, in modified form, a number of the characteristics of the Knox pleasure cars, the chief being the grooved-pin cooling system adopted for the engine cylinders. The largest car built by this concern is a three-ton truck, which was exhibited with a staked platform body. The chassis of this vehicle weighs 3,600 pounds; with body, about 5,000 pounds. The motor has two opposed cylinders and is placed horizontally under the body of the car; the bore is 5 inches and the stroke 7 inches, and the motor is rated at 16-20 horsepower. The drive is by a single heavy chain to a countershaft carrying the differential, and from sprockets on the countershaft to the rear wheels by side chains; the transmission is a very heavy planetary gear, and gives two speeds forward and one reverse. The dead rear axle is of steel, 2 1-2 inches square, while the front rear axle is of I-beam steel, 4 inches deep and 2 1-2 inches wide. Framing is of channel steel. The wheels are 36 inches in diam-



VEHICLE EQUIPMENT COMPANY'S THREE-TON ELECTRIC STAKE TRUCK.

eter, with solid rubber tires; the tread is wide, 62 inches, and the wheelbase is 111 inches. The loading platform, back of the seat, is 12 feet long and 5 feet 6 inches wide. The over-all dimensions of the truck are 10 feet 6 inches long and 7 feet wide. Speed, 10 miles an hour.

The same chassis may be fitted with a passenger-carrying body and the speed increased somewhat, the maximum being about 15 miles an hour. A 28-passenger stage shown was made in this way. The vehicle has six cross seats, the front one 50 inches wide and the others 72 inches wide, the total carrying capacity being 28 persons. A rack in front of the dashboard and another at the rear provides a place for carrying mail bags or light freight. A top is fitted, with side curtains, which can be lowered to enclose the entire vehicle in stormy weather.

A smaller vehicle exhibited was a delivery wagon with open body and a carrying capacity of 2,500 pounds. The power and transmission systems are the same as on the truck, with reductions in weight where necessary; the speed is higher, 18 miles an hour maximum. The wheelbase is 96 inches, tread 56 inches, and the wheels are 32 inches in diameter, shod with 3 1-2-inch solid rubber tires. The loading space in the body is 103 inches long and 45 inches wide. The wagon is furnished with or without top, and with lever steering as a standard equipment and wheel steering at an extra cost.

The lightest of the Knox commercial cars shown is a single-cylinder delivery wagon with a carrying capacity of 1,500 pounds. The engine is horizontally placed under the body; the stroke, 8 inches, is very long in comparison with the bore, 5 inches. The loading space is 76 inches long and 48 inches wide; the maximum speed of the car is 18 miles an hour. Drive is through planetary transmission and single chain to the live rear axle. Wheelbase, 78 inches; tread, 56 inches; wheels, 32 inches, with 3 1-2-inch solid rubber tires.

A truck chassis which is decidedly unusual in appearance, but apparently practical and well-built, is the three-ton truck chassis shown by the Hewitt Motor Co., of 10 East Thirty-first street, New York. The first impression given by this machine is that the frame is extremely massive. This appearance is caused by the fact that the pressed steel members of the frame and sub-framing are very deep, though not excessively heavy, the chassis weighing 5,000 pounds with body. The wheels are large and of great width, each wheel being fitted with two solid rubber tires. The next feature to attract notice is the engine. This is of the four-cylinder vertical type, water-cooled, and is placed under the driver's seat. The four cylinders are cast in a single piece, with water jackets, heads and valve chambers integral; instead of the usual closed crankcase the cylinders are supported on steel columns, marine fashion, diagonal braces being used to give stiffness.

No less than three means are provided for obtaining the ignition spark in order that danger of stoppage from ignition troubles may be reduced to the minimum. A magneto supplies current for a low-tension make-and-break system, and a battery can be switched into the circuit in case the magneto is disabled. Another set of batteries operates a jump-spark system through a vibrator coil.

The motor is rated at 25-horsepower, and drives through a heavy planetary transmission and side chains to the rear wheels. Main bearings are of babbitt, lubricated by force feed, the lubrication of the entire machine being automatic and requiring no attention beyond the filling of the oil tank. Connecting rod and other engine adjustments can be made without taking down the motor or removing any of its parts; the motor is protected from dust and dirt by a steel pan underneath and a steel cover above. Spiral gears with very broad wearing surfaces operate the camshaft.

A feature that should be useful in a commercial car is that the entire motor can be removed and another substituted in half an hour, thus an extra motor can be kept on hand, and if repairs or extensive adjustments are necessary to the regular engine the spare one can be put in its place and the car kept on the road practically without loss of time.

The two forward speeds and reverse are operated by pedals, there being a separate pedal for each change. A good feature of this arrangement is that the initial movement of any pedal automatically disengages any speed that may have been previously engaged. The friction bands are so arranged that they cannot be made to engage "fiercely," and the transmission is in these ways protected from damage due to careless manipulation. The friction surfaces are exceedingly broad to give long wear; the bands are of steel, lined with fiber, and work on cast iron drums. While provision is made for oiling the friction surfaces, the manufacturers state that it matters very little whether oil is used or not, the co-efficient of friction being almost the same with or without oil. The clutches are said to be unaffected by dirt or water.

Roller bearings are used in the wheel hubs. Brakes are expanding in the rear hub drums, the friction surfaces being fiber on cast iron. The gasoline tank, under the driver's seat, holds 50 gallons. Wheelbase, 120 inches; tread, 66 inches; wheels, 36 inches; loading platform, 12 feet long and 6 feet wide.

A smaller chassis exhibited by the same concern is similar to the chassis of the Hewitt small pleasure car. This chassis was also shown, fitted with a delivery body with rear doors. The engine is of 10-horsepower, with a single horizontal cylinder under the body. With body, the machine weighs 1,700 pounds, and has a rated carrying capacity of 1,000 pounds, though the manufacturers state that 1,500 pounds is not a serious tax on the car. The machine embodies some of the features of the large truck, such as removable engine, automatic force feed lubrication, three-pedal control of the planetary transmission with interlocks, and wide wearing surfaces on friction bands and drums. The body can be loosened and slid back on the frame to permit inspection of the machinery. Drive is by a single heavy chain to the live rear axle. Michelin tires are fitted to the wheels, though solid rubber tires will be used if ordered.

A two-ton truck with an open body, driven by a 30-horsepower, double-opposed, horizontal motor hung under the body, was shown by the Logan Construction Co., of Chillicothe, Ohio, while a 1,500-pound delivery wagon was used as a demonstration vehicle outside. The truck has a water-cooled motor driving through a sliding-gear transmission, countershaft and side chains to the rear wheels; a stationary axle is used. The gearing gives two speeds forward and one reverse. The axles are of I-beam steel. The framing is of heavy angle steel, trussed by a system peculiar to the Logan cars, and is carried on full elliptic springs front and rear; wheels are 32 inches in diameter, and are fitted with 4 1-2-inch solid rubber tires. The wheelbase is 100 inches and the tread 56 1-2 inches. The machine weighs 2,500 pounds, with open box body. Timken roller bearings are fitted to the road wheels.

The smaller machine, used for demonstration, has a capacity of 1,500 pounds, and weighs 1,150 pounds; tread, 56 inches, wheelbase 86 inches; motor, 20-horsepower; maximum speed, 15 miles an hour. Drive is by single chain to a live rear axle. Wheels are 30 inches in diameter, with 3-inch solid rubber tires.

A 3,000-pound gasoline truck with double-opposed cylinder motor was exhibited by the Rapid Motor Vehicle Co., of Detroit, Mich. This machine is fitted with planetary transmission gear, giving two forward speeds and a reverse, the drive, as is usual with motors of this type, being first to a countershaft carrying the differential, and then to the rear wheels by side chains. The motor has cylinders of 5 inches bore and 5 inches stroke. A feature of the car is that manganese bronze is used for both axles, the manufacturers stating that they believe this material particularly well suited to withstanding the constant vibration incident to road work, without crystallization or fatigue. The stubs carrying the front wheels are of the same material, with the steering arms cast integral. Special efforts have been made to secure accessibility of all parts; the motor is dissembled from the top downward, beginning with the top of the crankcase and ending with the bottom. The same feature of accessibility is found throughout the machine. The wheels run on roller bearings.

A striking example of heavy, substantial construction was shown in the Atlas three-ton gasoline truck, in which the engine and transmission are hung on the rear axle. This machine is built by the Knox Motor Truck Co., of Springfield, Mass. The engine has two horizontal cylinders placed parallel to one another, but with considerable open space between them; the engine is in front of the rear axle, with the heads pointing toward the front of the truck. Between the engine and the rear axle is the sliding-gear transmission, so that the engine drives direct to the live rear axle through the gears. An oil-tight casing encloses the entire system. No chains, bevel gears or universal joints are used. A single mechanical oiler, of large size, lubricates the entire system.

Owing to the fact that most of the weight of the machinery is carried by the rear axle without the intervention of springs, the axle housing is of exceedingly strong construction, and is greatly strengthened by a system of trussing which, with the axle and casing, forms a rear frame of great strength and considerable elasticity. From the rear axle to the front axle extends a frame of channel steel which is pivotally connected to the front axle. The cylinders are supported near their front ends by brackets attached to the frames, and the tubular radiator rests on the framing forward of the engine. Owing to the wide space between the frame and the body there is a free circulation of air through the radiator.

The engine is rated at 24-horsepower and has cylinders of 6 inches bore and 7 inches stroke; ignition is by jump spark. The clutch is a leather-faced cone and works into the flywheel, which is mounted close to the frame on the right-hand side of the machine. The transmission gives three forward speeds and reverse; the gears are very massive, having teeth 2 1-4 inches wide.

The car weighs 6,000 pounds and can be fitted with either solid rubber or steel tires, and with a body of any desired style. With an ordinary platform or open box body, the carrying space is 11 feet 3 inches long and 5 feet wide. The wheelbase is 114 inches and the tread 58 inches; wheels are 36 inches in diameter, and all brakes act on the hubs of the rear wheels.

The Crown delivery wagon, exhibited by the Detroit Auto Vehicle Co., of Detroit, Mich., is driven by a two-cylinder vertical motor, placed under the driver's seat, developing 16-horsepower, and driving through a two-speed planetary transmission and single chain to the live rear axle. The load capacity of the wagon is 1,500 pounds; the loading space in the closed body is 58 inches long, 40 inches wide, and 50 inches high, though as much as twelve inches can be added to the length, on order, if light but bulky loads are to be carried. The maximum speed is 20 miles an hour. The framing is of angle steel; wheels are 30 inches in diameter, with 2 1-2-inch solid rubber tires. Wheelbase, 78 inches; tread, 56 inches. The brakes are on the rear hubs and are of the internal expanding type. Hyatt roller bearings are used on the rear wheels and ball bearings on the front wheels. All springs are full elliptics. A tubular radiator is placed under the front of the footboard, flush with the dashboard. The gasoline tank holds 12 gallons.

MATHESON FIVE-TON GASOLINE TRUCK WITH FULL LOAD OF PIG IRON.

The Pope-Hartford gasoline truck exhibited by the Pope Manufacturing Company has a horizontal double-opposed motor of 20-24 horsepower under the driver's seat; a feature of the car is the magnetic control of the transmission, the current for operating this being supplied by a small engine-driven generator; a controller at the driver's left hand controls the various transmission clutches. The truck has a load capacity of two tons; the wheelbase is 96 inches and the tread, 63 inches.

One of the commercial cars which was shown in operation out of doors in the city streets and was not exhibited in either building was the Matheson five-ton gasoline truck, built by the Matheson Motor Car Company, of Wilkes-Barre, Pa. The car was fitted with a covered platform body and was loaded with five tons of pig iron, a load which was handled with apparent ease. A peculiarity in the arrangement of the truck is that there are two bucket seats, instead of the usual wide single seat, and the hood under which the motor is placed comes between the seats, thus economizing room—an important matter in a commercial machine. The motor is of the regular Matheson type with valves placed side by side and opening directly into the cylinders. The valves are operated by rocker arms carried by brackets on the tops of the cylinders, and the camshaft is placed so that the cams act directly on the outer ends of the rocker arms without the intervention of the long push-rods usually employed with similar valve arrangements. The camshaft is gear-driven by a vertical shaft rising from the end of the crankcase. The engine is controlled by throttling governor.

Friction drive was shown applied to commercial cars by the Buckeye Manufacturing Company, of Anderson, Ind., which exhibited two gasoline trucks, one of 1,500 pounds carrying capacity and the other of 2,000 pounds capacity with the Lambert friction driving gear. The trucks embody the salient features of the pleasure cars, though heavily built; the exhibit was always the center of an interested crowd. A more extended discussion of this drive will be found elsewhere in this issue.

The Mitchell Motor Car Company, of Racine, Wis., showed a closed delivery wagon having a carrying capacity of one ton with a tare of 1,600 pounds. The motive power is supplied by a two-cylinder vertical motor placed with crankshaft fore-and-aft, rated at 12-14 horsepower; drive is through cone clutch, three-speed sliding gear transmission and propeller shaft to the rear axle. The motor is water cooled. Framing is of pressed steel of heavy gauge; wheelbase is 96 inches; tread, 56 inches; wheels are 32 inches in diameter and are fitted with solid rubber tires. This handy machine was shown in operation out of doors.

The Maxwell 1,000 pound delivery wagon

embodies the main features of the Maxwell pleasure cars, manufactured by the Maxwell Briscoe Motor Company, of Tarrytown, N. Y.; the motor is of the double-opposed cylinder type, developing 16 horsepower, and is placed under the body, driving through multiple disk clutch, three-speed sliding gear transmission and propeller shaft to the rear axle which is, of course, of the live type. The car weighs 1,550 pounds; wheelbase, 87 inches; tread, 56 inches; wheels, 30 inches in diameter, with 3 1-2-inch tires. The frame is of pressed steel. This truck was shown in actual operation in the streets and caused much favorable comment.

A very strongly built three-ton gasoline truck with a 30-horsepower, four-cylinder horizontal engine, was shown by the Commercial Motor Car Company; the machine has a steel frame. One of the features is the construction of the tires. These consist of a series of segments, made of rubber and fabric in alternate layers, each segment being about twelve inches long. The segments are placed so as to "break joints" and five segments are placed side by side. The engine is placed in front and drives through an Adams transmission, jackshaft and double chains to the rear wheels. The Adams transmission is operated by a sliding key, working in a splined shaft and engaging with slots cut in the hubs of the gears. The key is moved by a lever beside the driver, and the transmission gives two forward speeds and a reverse.

Electrics.

In electrical commercial cars there are comparatively few broadly distinguishing features, the opportunities for individuality being far more limited than in the gasoline cars; besides, the electric machines are, to a great extent, standardized and are much more familiar to the public than the gasoline cars, which are, except in a few cases, comparatively new arrivals in the field. Most of the exhibitors of electric wagons have been building these machines for some time; but the Studebaker Company, though its carriages and wagons are known around the world and its electric and gasoline pleasure cars have already made a name for themselves, is a comparatively new exhibitor in the commercial vehicle field. Five machines were exhibited, the largest a five-ton truck and the smallest a 1,000-pound delivery; between these came a 3 1-2-ton truck, a 2-ton truck and a 2,500-pound wagon. All the Studebaker commercial cars embody the same general features. The cars are all equipped with Exide batteries supplying current for two motors, each motor driving one of the rear wheels independently of the other. This arrangement obviates the necessity for a differential; the rear axle is stationary, a solid steel forging. Both battery and motors are suspended from the frame, thus getting the benefit of the cushioning effect of the springs—a feature which, the manufacturers state, adds greatly to the useful life of both.

RAPID 3,000-POUND DELIVERY WAGON WITH DOUBLE OPPOSED GASOLINE MOTOR.

The Pope Motor Car Company, of Indianapolis, Ind., exhibited four Waverley electric machines. The heaviest was a 3-ton truck of a type much used by large milling concerns. The whole body is covered by a standing top, while the rear portion has standing sides. Curtains are supplied, so that the entire car can be enclosed. Two motors drive to the rear wheels through a countershaft and heavy side chains; the battery consists of 42 cells. Wheels are of wood, 36 inches in diameter, with 5-inch solid rubber tires. The loading space is 13 feet long, 4 feet 6 inches wide and 6 feet high. The wheelbase is 112 inches and the tread 76 inches. A one-ton truck shown embodies the same general features on a smaller scale, though the body is a plain platform with a carrying space 10 feet long and 6 feet wide. The wheelbase is 96 inches and the tread 62 inches. A closed delivery wagon has a carrying capacity of 1,200 pounds and a carrying space 5 feet 2 inches long, 3 feet 4 inches wide and 4 feet 8 inches high; a single motor, suspended from the body, drives through double reduction gears and side chains to the rear wheels. The Waverley open delivery wagon, the lightest machine shown at this stand, has a carrying capacity of 800 pounds with an open body 5 feet 3 inches long and 3 feet wide behind the driver's seat. Two motors drive the rear wheels through spur gearing. Wheelbase, 80 inches; tread, 54 inches. The wheels are 30 inches in diameter and are fitted with pneumatic tires, 4 inches in the rear and 3 1-2 inches in front. The Waverley cars are fitted with either Exide or National batteries. All the cars shown except the 800-pound delivery wagon have 42 cell batteries; the light machine carries 30 cells.

A 14-passenger electric omnibus was shown by the Auto-Car Equipment Company, of Buffalo, N. Y. This machine has an oak frame armored with steel flitch-plates, with a reachless running gear and a three-point suspension system. Two Westinghouse motors of 7 1-2 horsepower each drive the rear wheels through heavy chains. The battery consists of 44 cells of 13 M. V. Exide; the machine has a maximum speed of 15 miles an hour under load. The total weight is 5,600 pounds. The interior is arranged in the usual omnibus style, with seats, 18 inches wide, along each side. The three large plate-glass windows on each side can be dropped into pockets out of the way; there is a window in the door, one just back of the driver's seat and one at each end of each side seat. Wheels are 36 inches in diameter with solid rubber wire-mesh Diamond tires, 4 inches in the rear and 3 1-2 inches in front. Axles are of hand-forged steel, 2 inches square. Roller bearings are used throughout the machine. Electric lamps are fitted inside and outside.

The electric delivery wagon exhibited by the Lansden Company, of Newark, N. J., is fitted with an armored wood frame carrying the entire power equipment. The single motor, hung near the front of the frame, drives by chain to a countershaft carrying a differential, and the countershaft drives to the rear wheels by sprockets and chains, the rear axle being of the solid stationary type. The underslung battery compartment is arranged to take any battery that may be specified by the purchaser, and a special charging box with switch is attached to the car within easy reach of the operator. All parts are interchangeable. The springs are all semi-elliptic.

An express wagon with a carrying capacity of 4,000 pounds was shown by the McCrea Motor Truck Company, of Cleveland, O. A wagon of this type is used by the United States Naval Academy at Annapolis, Md., for hauling supplies. The battery is hung under the body in the conventional way and the motors drive the rear wheels by side chains. The speed is about 8 miles

an hour under load and the working radius is 40 miles on a single charge. Different bodies can be fitted to the same chassis for different classes of work.

A light closed-body delivery wagon exhibited by the Pittsburg Motor Vehicle Company, of Pittsburg, Pa., has a maximum carrying capacity of 1,000 pounds and is driven by a single motor with single-chain drive to a sprocket carried on the differential casing on the right-hand side, close to the wheel. The differential drives one wheel through a tubular sleeve and the other through a solid axle, so that a divided rear axle is avoided, but the simplicity of a single-chain drive is retained. The battery consists of 24 Exide cells and gives the car a mileage of about 35 with a maximum speed of 11 miles an hour.

Four vehicles are shown by the Electric Vehicle Company, of Hartford, Conn., manufacturers of the well-known Columbia electric cars. The machines shown range in carrying capacity from 1,000 pounds to three tons. The heavy truck is equipped with two independent motors driving the rear wheels through spur reduction gears and side chains. The frame is of I-beam iron; wheelbase, 113 inches; wheels are 36 inches in diameter with 5-inch solid rubber tires. The speed is 8 miles an hour and the radius of action 30 miles on a charge. The Columbia 2,000-pound express wagon embodies the same mechanical features as the larger car and is adapted to receive any style of body. Wheels are 36 inches in diameter with 3 1-2-inch solid tires; the speed is 11 miles an hour and the radius of action 35 miles, with full load. A 1,000-pound delivery wagon was on view with two motors and direct gear drive to the rear wheels. All the Columbia cars have Exide batteries carried in trays and fitted with automatic contacts to facilitate removal and replacement. The largest machines have 44 cells; those of less than 3 tons' capacity have 42 cells.

A five-ton truck with electric windlass attached was the largest of the six machines exhibited by the Vehicle Equipment Company, of Brooklyn, N. Y. These cars have pedestal guides in which the axles rise and fall without lateral motion—an arrangement which has always been standard in railroad work and seems to answer equally well for heavy trucking. Two motors are used; these are suspended from the side frames and drive the rear wheels through spur gears bolted to the hubs. The V. E. Company follows the usual practice of manufacturers of electric commercial vehicles in using the same general features in machines of all sizes. A three-ton brewery truck, a two-ton truck and three delivery wagons of 1,000 pounds, 2,000 pounds and 3,000 pounds capacity respectively, embody the standard V. E. features of construction.

Considerable difficulty was experienced in obtaining details regarding some of the vehicles, and a few exhibits seemed practically deserted, repeated visits having been made without finding an attendant in charge.

GREAT DISPLAY OF SUNDRIES AT THE SHOWS.

THE holding of the New York show this year in two of the largest of New York's public buildings gave opportunity for a display of parts and accessories that not only exceeded any previous exhibition but gave an adequate idea to the visitor of the magnitude of the sundries industry. The immense variety of parts, fittings, supplies, and accessories indicated the vast total of capital invested in the plants engaged in the production of articles brought into existence solely by the advent of the automobile.

Notwithstanding their comparatively small size, nearly as many actual square feet of floor space were required for the exhibition of sundries as for the complete cars themselves, while the number of exhibitors was much in excess of the number of car makers. In the Garden show the parts and sundries makers monopolized not only the first and second balconies and the first and second tier boxes, but also the concert hall and were to be found in the basement. At the Armory the gallery all around the vast drill hall was completely occupied by the accessories exhibits, which overflowed this space and were located in the basement and in a number of the company rooms.

Developments in the sundries lines are of almost as much interest to the car owner as the tendencies in automobile construction, so that it is in no wise surprising that the galleries were well filled each day and night of the shows by visitors, who looked eagerly for novelties. They were not disappointed in the quest, for the shows of 1906 were prolific in new things and marked interesting departures from the drift revealed at previous shows.

Never before have automobile tops made such a showing as this year; upwards of a dozen concerns made displays of tops alone. These were almost without exception of the four-bow extension or folding form, thus marking an advance beyond the Cape Cart style of hood that was popular a year ago. The coverings are most commonly of mackintosh cloth and pantasote, while the storm aprons and curtains are generously lighted by large sheets of celluloid, which is light, transparent and can be rolled up with the curtains without cracking.

For the first time shock absorbers made their appearance in number at the show. At least ten different makes were displayed, most of them so recently put in the market that only samples could be shown. Some of these were sectioned to show the internal construction. At most of the stands practical demonstrations of their operation were made by means of a section of car frame with spring attached and the absorber interposed.

Another interesting development in the accessories display was the advent of the prominent high-grade steel manufacturing concerns into the trade with special grades of chrome nickel steels and phosphor and

MACK GASOLINE TRUCK WITH MOTOR UNDER HOOD.

KNOX AIR-COOLED GASOLINE 16-20-H.P. TRUCK.

manganese bronze for axles, gears, crankshafts, crank cases and gear cases, and similar parts where great strength, toughness and light weight are important considerations.

Anti-skid tire treads and tire attachments were in greater variety than ever before, the metal studded leather tread vulcanized onto the regular pneumatic tire having made great advances in popularity.

Improvements in mechanical lubricators and ignition apparatus have made good progress during the year, as revealed by the additions to the numerous makes of oilers, spark coils, spark plugs and igniters.

Alarm signals sounded by exhaust gas from the engine have multiplied since the original one was exhibited at the Garden show a year ago, the popularity of the chime signal not having escaped the attention of manufacturers with an eye open for their business interests. Simultaneously the siren has come into prominence, several makes of these signals adapted to be operated by contact of a pulley with the engine flywheel having been put in the market during the past season.

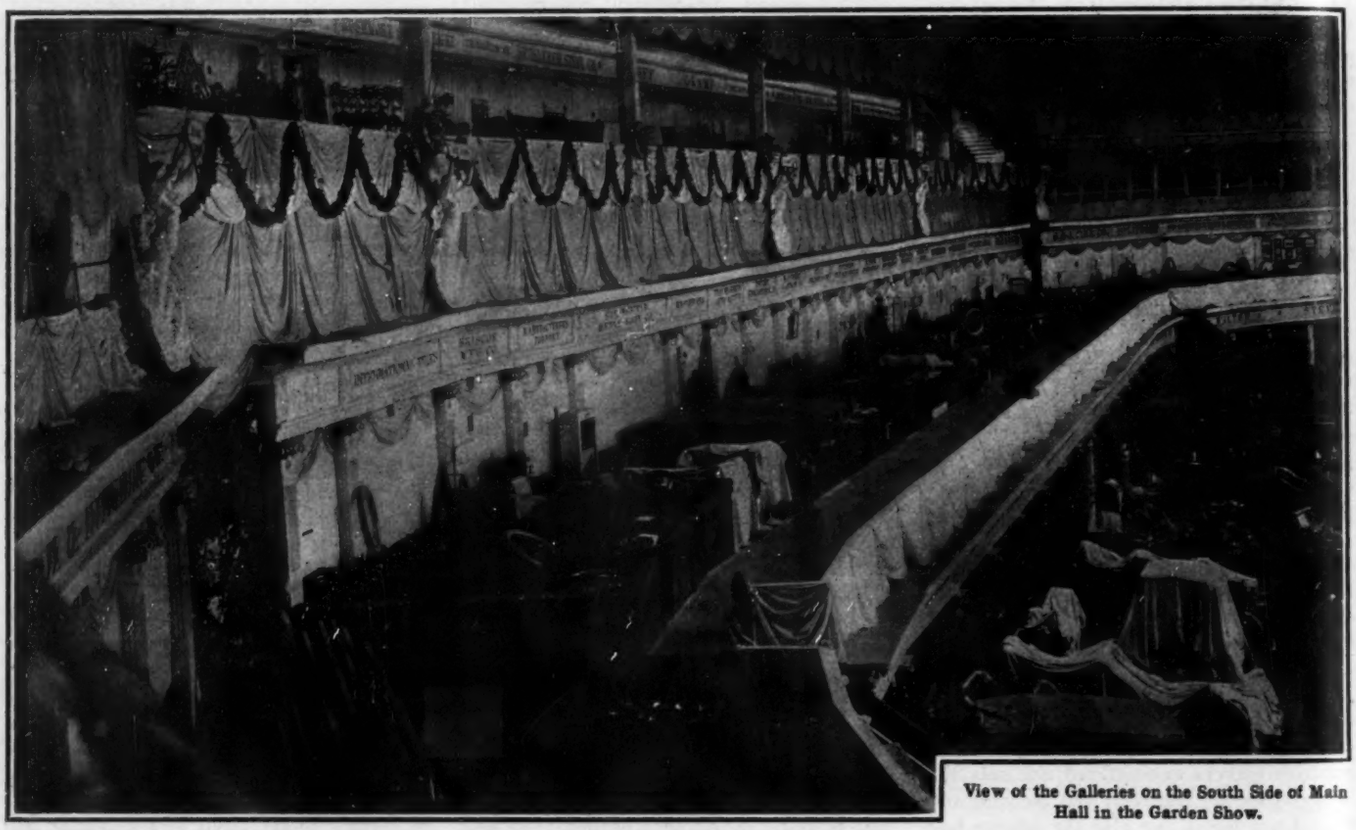
An innovation at the New York shows of 1906 was the subscription booths of the automobile press at both the Garden and the Armory.

In the following columns are briefly mentioned the lines of goods displayed by each maker of or dealer in parts or sundries, with the novelties especially emphasized and the characteristics of each pointed out.

AMERICAN ELECTRIC NOVELTY & MFG. CO.—One of the very few automatic starting devices for gasoline engines was shown by this concern. It is called the Ever Ready starter, and consists of a heavy band spring with suitable releasing mechanism all housed in a case mounted at the front end of the engine crankshaft. A handle for cranking is provided for an initial winding of the spring, although once the engine is started it is depended upon to rewind the spring automatically. It was asserted that the spring when fully wound has sufficient strength for turning over an engine of 20 to 40 horsepower. Another novelty by the same company was the Ever Ready trip detector, a neat and well-made device in the form of a circular wood case with plate glass cover to be locked on the dash. Inside the case is a brass disk with milled edge which carries a cardboard dial graduated by miles. An arm with a pencil point is in contact with the face of the dial and a dog engages the milled edge of the disk one notch at a time. This dog is attached to a spring that carries at its outer arm a weight that vibrates vertically when the car is running on the road. Suitable locks are provided for stopping the action and for opening the case. The purpose of the device is to enable the owner of a car to know approximately how much the car has been run in any given time, placing a check on the unauthorized use of the machine by a chauffeur or any other person. Among other articles shown was a gasoline filler to be permanently inserted in the gasoline tank and having a telescoping tube cut away on one side so as to catch any splash from the gasoline can when pouring. It also had an indicator dial to show the amount of oil in the tank at all times. Ever Ready dry cells for ignition batteries were also on exhibition.

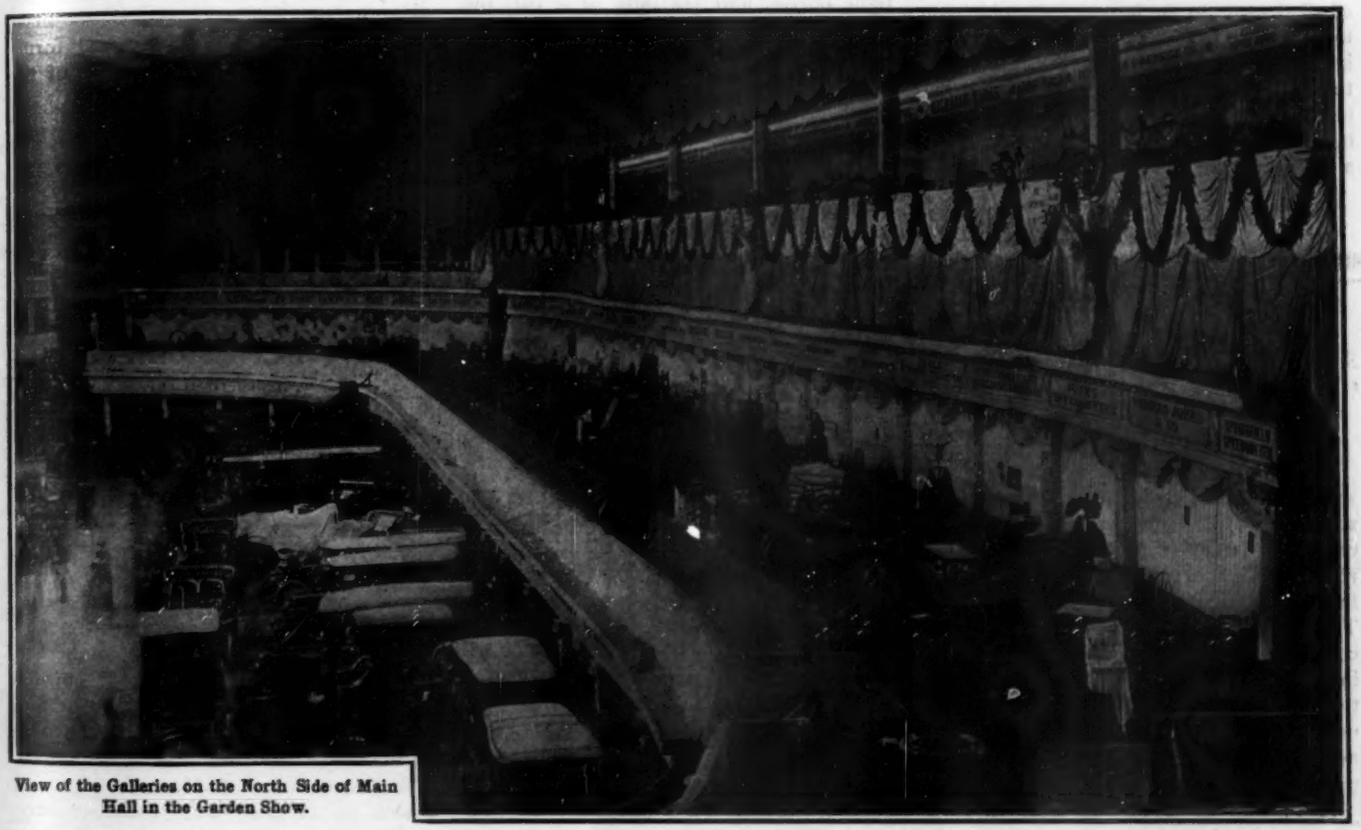
AUTO ACCESSORIES CO.—An exhibit of varied character was made, the most prominent object being an extension automobile top for a side-entrance touring car, covered with black pantasote and fitted with storm apron, side curtains and rear curtain. All the curtains had large celluloid lights, providing illumination of the interior from all sides of the car. There were three lights on the side curtains—an almost general practice this year with all top makers—the central one in this make being oval and the end ones triangular. Another prominent feature of the display was a rack filled with a variety of waterproof automobile coats in khaki, cravenette, mackintosh, gossamer and other materials for both men and women. A new garment in this line for the coming season is a raincoat made with double front, buttoning first far over on the left side, then lapping over and buttoning down the right side. This gives double protection on the breast and knees when driving into a heavy rain. Several Sterling gas head lamps made by this company were shown, and as a novelty the company displayed an automatic turning bracket to be socketed on the front spring horns and connected with the steering mechanism so that the light of the lamps will always be thrown in the direction the wheels of the car are pointed.

AUTOMOBILE COVER & TOP MFG. CO.—A most attractive exhibit was a rich wine colored extension top shown on a lemon yellow and black striped Pope-Hartford body. The



View of the Galleries on the South Side of Main Hall in the Garden Show.

covering of the top was a very fine texture imported mackintosh waterproof cloth, while the bows and joints were covered with red leather; sockets and buttons were polished brass. An interesting feature was red leather cover slips for protecting the roll of the upholstery over the edges of the body. A more serviceable top on similar lines to the foregoing, but covered with a gray mackintosh that would not show dust and rain spots, was also shown. The bows were of hickory in the natural finish. As Eastern distributing agents for the manufacturers, the company displayed Gabriel horns in different sizes and styles, supplemental spiral springs for use at the ends of the rear spring horns, and a compact wine cabinet, with ice compartment, to be carried in the car.



View of the Galleries on the North Side of Main Hall in the Garden Show.

ATWOOD MFG. CO.—A big display of the Atwood lamps with the latest features in appurtenances made an attractive exhibit. The new Atwood generator was shown, its leading characteristic being simplicity. The ease with which the carbide basket can be loaded and unloaded is a point dwelt strongly upon by the makers. The carbide is kept cool with water jacket about the generator, and the residue after consumption is in the form of dust instead of paste. The new models in lamps consist of a diamond-shaped oil lamp styled "No. 31," and two diamond backed gas lamps of distinctive and unique construction, designated as Nos. 9 and 12 in the catalogue.

ADAM COOK'S SONS.—Here was shown a complete line of the well-known Albany grease, in all the consistencies required for automobile use, put up in cans of various sizes for garage or shop use and for carrying on machines.

AURORA AUTOMATIC MACHINERY CO.—The line of Thor fittings for automobiles and motorcycles was displayed. Also on view, motors complete and in parts, pneumatic tools, such as air drills, wood-boring machines, hammers, etc. The installation of complete air plants is a specialty of the exhibitor, and everything that enters into the composition of such a plant was shown in sample.

ASTER CO., AMERICAN BRANCH.—Three models of the well-known French Aster four-cylinder motors were shown—20-horsepower, 22-horsepower and 30-35-horsepower. Cylinders are cast in pairs and valves are mechanically operated; in the smaller Aster motors the valves are all on the same side, while the larger motors have valves on opposite sides of the cylinders. Two chassis, without motors, were also shown, as well as a number of steering gears and other parts.

AUTO COIL COMPANY.—This concern has introduced a radical change in its coils this season by adopting hard rubber for units instead of wood. A large display of coils, single and multiple, was on view.

ATWATER KENT MFG. WORKS.—New spark generators and timers were shown, also a new ammeter. The spark generator has mechanical vibrator and no timer. Small battery consumption is claimed.

AMERICAN GENERATOR CO.—This exhibit consists of a carbureting device in which gasoline is stored by an absorbent agent and the gas drawn from the tank or receptacle by the engine. Great economy and a perfect mixture are claimed by the manufacturers.

AMERICAN BALL BEARING CO.—Several specimens of axles and other parts of well-known cars, fitted with roller bearings made by this company, were shown, also separate bearings of different sizes and for various uses.

AUTO BRASS & ALUMINUM CO.—Two new power-driven mechanical oilers were shown at this stand, also tank fillers, babbitt-lined bushings, foot pedal plates, a safety cranking device and tonneau door handle.

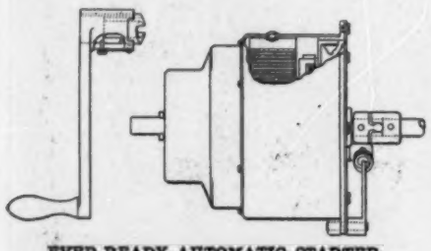
AUTO-SUPPLY CO.—Two wax figures in automobile costumes effectively staged lent a distinguishing character to the exhibit, which consisted of a complete supply of everything for the autoist's use, as the name of the company indicates. The house announces that its new sixth annual catalogue, now in press, will be larger and more complete than any of its predecessors.

AUTO IMPROVEMENT CO.—A display of the "Ever Ready" line of automobile utilities, including dry-cell batteries, pocket ammeters and flashlights, electric bulb lamps, gasoline filler and trip detector, the latter described as "a silent little sentinel which faithfully watches over your car when you are absent," and which mechanically records its every authorized and unauthorized movement. The real feature of this exhibit was the "Ever Ready Starter," a spring device designed to start a car by simply tripping a small pedal release lever located within convenient reach of the operator's foot. The running of the engine automati-

cally rewinds the spring. The whole operation was shown by means of a working model mounted on a frame.

AUTO-LOCK-PLUG CO.—Without electric current the modern gasoline car cannot be operated, and if the supply of electricity is interrupted in such a way that it cannot be re-established except by the owner of the car the danger of theft or unauthorized use of the machine is much reduced. This concern makes a lock switch which can only be turned by its own key; the lock is a Yale, and no two can be opened by the same key. There are no exposed points on the switch which would enable connections to be made outside. Three keys are provided with each switch.

BYRNE, KINGSTON & CO.—An extensive exhibit of Kingston carbureters and mufflers of all sizes, from the largest automobile size to the smallest, suitable for motorcycles, also ignition apparatus—coils, spark plugs and timers—steering wheels and circulating pumps for water and oil. Two types of carbureter are now manufactured, one having a plain float in a chamber at one side of the



EVER-READY AUTOMATIC STARTER.

spray chamber, and the other having a float surrounding the spray nozzle, so that the carbureter is not affected by changes in the road level. Three new carbureters are added to the Kingston line this season—Type K, Type KC, and automatic Type D. A dash coil with single adjusting screw made its initial appearance at the show in connection with the new carbureters, and also a new timer of the roller contact type. In addition to the above the Kingston mufflers and steering wheels were shown.

S. F. BOWSER & CO.—In addition to a variety of oil and gasoline tanks, self-measuring pumps, cabinets and other apparatus for handling lubricating and fuel oils, the Bowser company showed a distinct

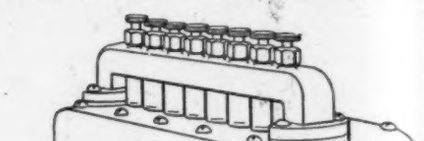
ELLIS ADJUSTABLE S WRENCH.

novelty. This is a portable tank, mounted on wheels and carrying its own self-measuring pump. The tank holds 65 gallons and is mounted on two heavy wire wheels; a handle at each end, folding out of the way when not wanted, provides means for pushing the tank about. The pump, self-measuring and adjustable, is on top of the tank and is similar to the regular Bowser pump. A novel detail is that as gasoline is pumped, through a hose and a tight nozzle, into the tank of a car, the vapor-saturated air in the car tank is forced through another hose into the portable tank, so that there is no escape of inflammable gas into the room. The same gas transfer plan works when the portable tank is being filled from the main tank, so that gas is always kept where it can do no harm. The nozzles have valves in their ends, preventing any dripping. The filler is an air-tight fit and is covered by a brass dome on a hinge; the dome may be locked down and the pump also can be locked. A sales record machine is attached to the top of the tank, so that as gasoline is supplied to a car, for instance, a check is given to the chauffeur, one remains in the machine for record and a third is placed in a special receptacle on the side of the tank for the use of the garage. A gasoline gage is also fitted.

BOEHM & LEVINE.—This was an exhibit to appeal to automobilists of the fair sex, and contained things that can only be described by a woman. A sort of combination hood, veil and scarf was shown, under the name of "Mon Bijou," which looked as if it might be an extremely useful affair. Pulling a string transforms it from a scarf to a hood with veil attached; pulling the buttons changes it back to a scarf.

JOHN BOYLE & CO.—Automobile touring has become so popular that this concern has manufactured a line of trunks especially for automobile use; a special style of trunk is made for each one of a number of different makes of car, so that the trunk can be strapped on without trouble. A number of these trunks, as well as other leather goods, lunch baskets and the like, formed an exhibit that was particularly attractive to automobilists who delight in touring. Tags, numbers, tire cases, tool rolls and tools were also shown.

BADGER BRASS MFG. CO.—Among the new goods shown was a generator for gas lamps made in circular form, each section in one piece of drawn brass and seamless. Three sizes of the round models were shown. The shells were of heavy gauge and soldered seams were avoided. With the new system of gas generation used the water in the tank saturates a wick in the tube, and when a valve is turned on, this drops into a screen tube, and, passing out of the holes at the bottom, comes into contact with the carbide in the cage and forms the gas which passes out at the top of the

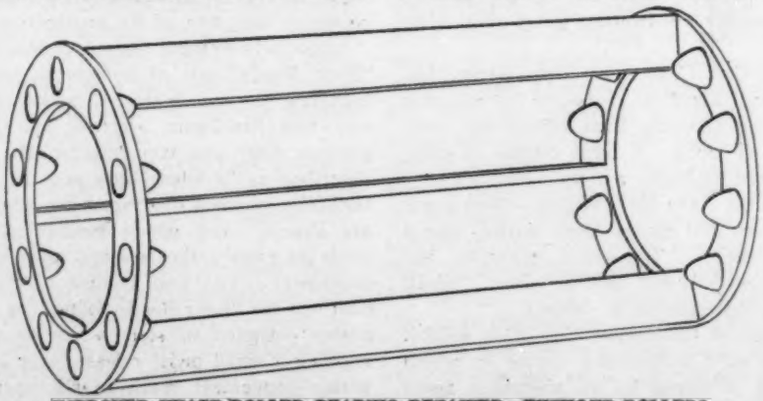


AUTO B. & A. CO. SIGHT-FEED POWER-DRIVEN MECHANICAL OILER.

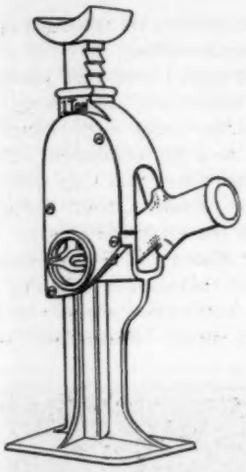
generator. The unused carbide held in the cage is separated by the screen in the bottom, and the used material falls to the bottom of the cage in the form of dry powder. The display of solar lamps was a fine one, over twenty-five varieties being shown in all the marketable sizes.

BALDWIN CHAIN & MFG. CO.—Sprocket chains of all sizes were exhibited here, supplemented this year by the Baldwin Spring Recoil Check, an automatic frictional device which, attached to the body and axle of a car, controls the recoil of the springs. The Monitor speed recorder was also in operation here, the speed of an electric-motor-driven anemometer being recorded on a card in plain view of the spectator. One new size of chain was shown, of one-inch pitch and five-eighths inch wide. The Baldwin company will act as selling agent for the Monitor speed recorder.

BROWN & LIPE GEAR CO.—Samples of equalizing and steering gears were shown. The company claims the honor of being the originators of the spur gear type of differential gearing as applied to automobiles, and for many years has made gear-driven mechanisms exclusively. Nine mod-



IMPROVED HYATT ROLLER BEARING RETAINER—WITHOUT ROLLERS.



BARRETT SINGLE-ACTING JACK.

els of equalizing gears and two models of steering gear were displayed.

BRISCOE MFG. CO.—Radiators, radiator coils, fans, hoods, fenders and tanks constituted the exhibit of this concern. The radiators were shown in sizes and shapes to correspond with the lines of the better-known American cars.

BRENNAN MOTOR MFG. CO.—Complete motors ready for delivery to the trade is the specialty of this house, which exhibited its new four-cylinder vertical engine with mechanically operated valves. A new crankcase compression oiler and new carbureter with hot air strainer are among this year's improvements. All sizes from 18 to 80 horsepower are made for autos or for marine use.

E. M. BENFORD.—Lipman electrical speed indicators and Lipman pumps were shown, also the Auto Plex batteries and Peerless perpetual spark plugs.

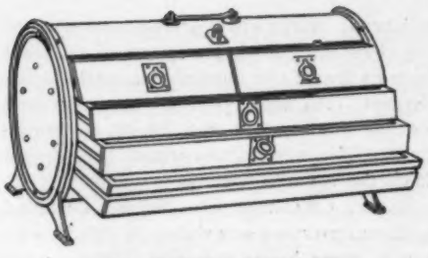
BARNES GEAR CO.—The adjustable steering gear made by this house, and upon which letters patent were recently issued, was the feature of the exhibit. The nut and screw principle is used, but an adjusting lever is applied to take up the wear.

WILLIAM HIRAM BROWN.—The main feature of this exhibit was the Brown motor car dust guards, which were shown attached to a tonneau. These guards are so placed as to detract in no way from the appearance of a car, and, besides, do not interfere with the view. They can be put in position or removed in ten minutes' time. Another feature of the exhibit was the Elephant tread tire, which is claimed to be non-skidding and more resilient than a solid.

BETHLEHEM STEEL CO.—Drop forgings in every style, also a considerable display of flange steel parts.

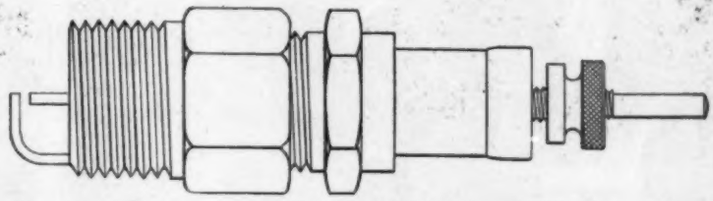
CARPENTER STEEL CO.—Eight great steel war projectiles, several of which measured twelve inches in diameter, drew attention in the basement of the Garden to an exhibit of special steels suitable for automobile construction. The Carpenter company, which is one of the large manufacturers of war material for the government, arranged its exhibit with the idea that the display of projectiles wiuld be a convincing proof of its ability to provide special steels of great tensile strength for axles, shafts, gears and similar automobile parts. One of the projectiles shown bore a placard announcing that it had passed through eighteen inches of hardened armor plate; it bore no visible evidences of such a severe test. The exhibit of steels included billets in the rough, crankshaft blocks in the solid and in different stages of cutting out to shape and machining; various small automobile parts drop forged from Carpenter steels by one of the company's customers who loaned the parts, axles drop forged by the Carpenter company upon special order after blueprints furnished by customers, various pieces of metal and auto parts bent and twisted under enormous tensional and tortional tests. Several grades of chrome nickel steel and milder nickel steel are made by the company for gears, crankshafts, axles, etc. The finest grades have shown a tensile strength under tests of as much as 275,000 pounds per square inch when tempered, while a four-throw crankshaft for a 40-horsepower engine was distorted only about four inches at the center under a load of sixty tons applied at the middle.

COOPER HEWITT ELECTRIC CO.—The mercury vapor charging outfits recently illustrated and described at length in THE AUTOMOBILE were exhibited in several sizes. The largest was a panel for charging ten Baker electric carriages simultaneously, being one of a number of such panels recently ordered by the Cook & Stoddard Co., of Washington, D. C. Two standard thirty-ampere charging outfits for charging batteries of from twelve to forty cells and one small five-ampere outfit for charging small ignition batteries were also shown, while the whole stand was illuminated by the well-known greenish light of the Cooper Hewitt mercury vapor lamps. All the charging outfits employ the mercury vapor bulbs for converting the alternating current used for street lighting into direct current for recharging batteries.



20TH CENTURY TOOL BOX.

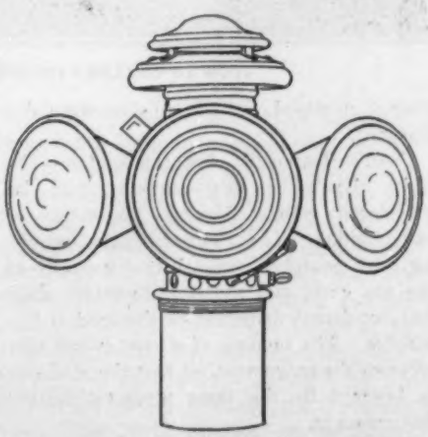
WM. CRAMP & SONS SHIP & ENGINE BUILDING CO.—Particularly interesting to manufacturers and technical men was the Cramp exhibit of special castings of bronze, including crankcases, wheels, small parts and an I-beam front axle, the latter a fine piece of work. The company states that an important advantage of bronze castings is that they do not warp or twist, but come from the foundry true to the patterns. Bearings are a specialty of this concern, which has had wide experience in the heaviest class of bearing work.



DUPLEX SPARK PLUG, WHICH FIRES WHEN SOOTED.

C. COWLES & CO.—L. C. Cowles, vice-president of this concern, demonstrates a unique novelty in the form of an electric annunciator designed especially for automobile use. It has a circular dial (usually fastened to the dash) covered with a face of red glass, upon which are eight divisions

EVER-READY TRIP DETECTOR.



SOLAR (SELF-CONTAINED GAS GENERATOR) LAUNCH HEADLIGHT.

indicating briefly eight driving directions to the chauffeur. By pressing one of the eight buttons inside the limousine a small incandescent lamp lights up the corresponding section on the dial, the others remaining dark. The necessary current is obtained from the ignition battery.

ALBERT CHAMPION CO.—French imported ignition apparatus was shown by this Boston house, many being novelties. There were Nieuport coils and a new Nieuport magneto, that can be run under water, so tight is its brass case. Nieuport plugs and a line of French insulated cables in all sizes were also featured.

COOK'S RAILWAY APPLIANCE CO.—The jacks shown by this company may be considered among the real necessities of automobiling. The standard jacks, weighing 8 1-2 pounds, have a lifting capacity of one ton each, and the manufacturers state that accidental dropping of the load is impossible. The turning of a cam at one side reverses the movement, so that the load can be lowered by the same pumping motion that raises it.

CARBONDALE CHEMICAL CO.—The exhibit comprised solutions for use in the circulation system in cold weather, the solutions being non-freezing down to any desired temperature; the "Kalkrystal" solutions, as they are called, can be supplied in strengths that will remain fluid at 18 degrees below zero. They are put up in cans of convenient sizes.

CONSOLIDATED MFG. CO.—The 1906 model of the Yale-California motorcycle was on exhibition at this stand. Many adherents of two-wheeled automobiling congregated around it, and the consensus of opinion seemed to be that the new Y.-C. shows a marked advance over the 1905 machine.

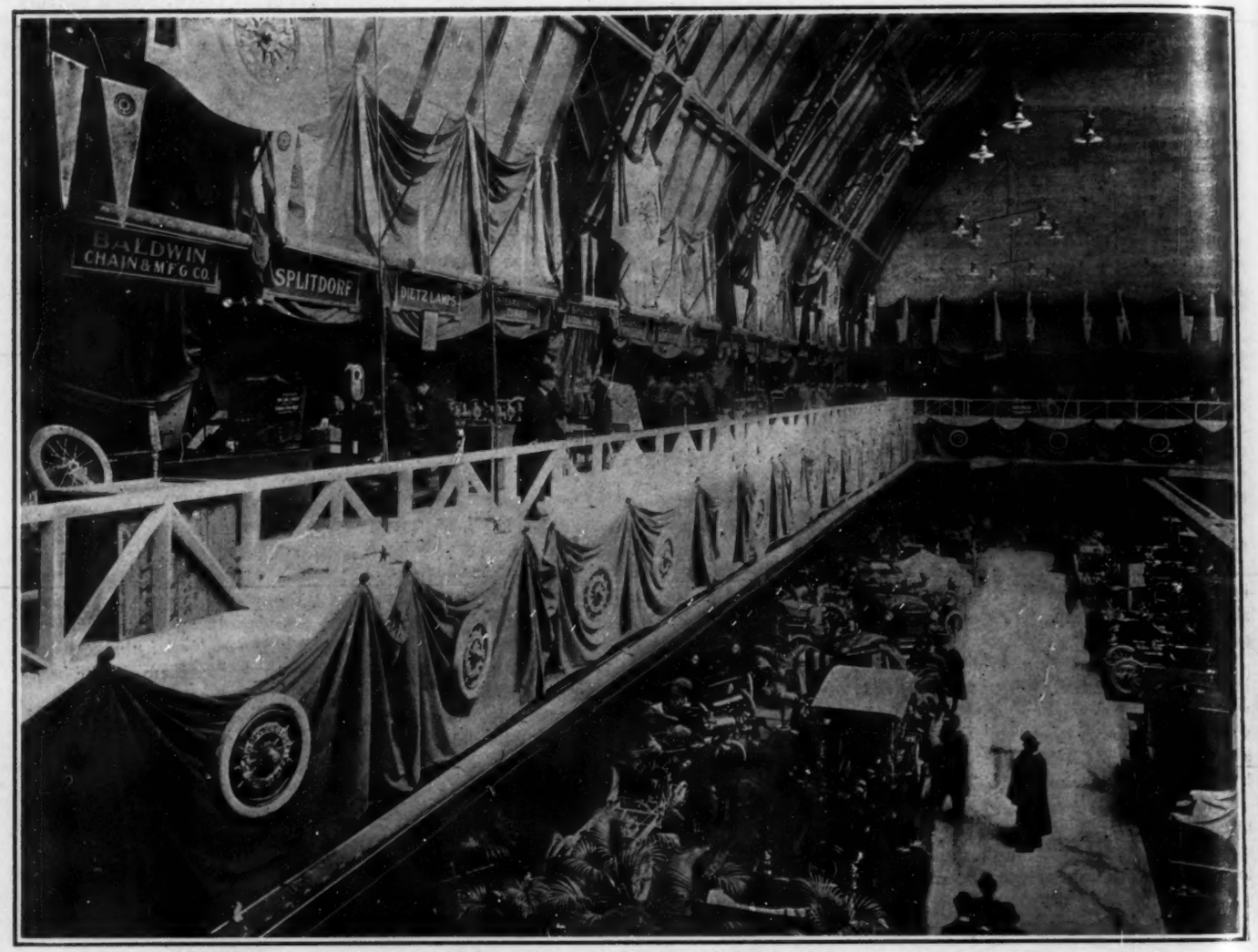
COLUMBIA LUBRICANTS CO.—Monogram oils and greases were shown in all varieties at this stand. The line includes heavy, medium and light oils, and a variety of greases for gears and joints.

CONNECTICUT TELEPHONE & ELECTRIC CO.—This concern exhibited the Connecticut coil current indicator, a special form of indicating meter attached to which is a double conducting cord and metallic circuit plug; with this indicator it is possible to see at any time just how much current is being drawn from the battery, and, if excessive, to reduce it and thus lengthen its life. Other specialties shown were the Connecticut coils, meters and switches.

DAC SUPPLY HOUSE.—A comprehensive line of automobile accessories, such as lamps, horns, tools, tire vulcanizers and batteries, was on exhibition. Fully one-half the space was taken up with a display of Gaulois (French) tires, for which this house has the exclusive agency.

DETROIT MOTOR CAR SUPPLY CO.—A large exhibit of automobile clothing for all weathers, automobile accessories and supplies, was made. Particularly seasonable were the robes and weatherproof coats shown. This concern manufactures automobile bodies, tops, tire cases, clothing, caps, storm aprons, dash clocks, wind screens and other automobile accessories. The company claims to be the largest manufacturer of automobile bodies in the United States, and had in the Armory an exhibit of several up-to-date styles of coupé, landaulet and limousine bodies. A special runabout top, complete with side curtains, storm front and body irons, appealed particularly to the users of small cars.

DIAMOND CHAIN & MFG. CO.—Diamond



VIEW OF GALLERY ON SOUTH SIDE OF THE 69TH REGT. ARMORY SHOWING EXHIBITS OF ACCESSORIES.

automobile and auto boat chains and various forms and sizes of steel sprocket stud chains and brass boat chains were displayed. The special sprocket chains were highly finished, of great tensile strength, and had the rivets spun smooth.

R. E. Dietz Co.—A new lamp, the Peerless W, with window in the side, a dainty side lamp for runabouts, and a new generator, are the features of 1906 additions and improvements to the Dietz line. The new gas generator is called the Acetyvone. It uses a compound moulded into sticks of a suitable form and size to fit a tube in the generator, and only that determined surface which is automatically placed in contact with the water generates the gas. This allows the generation of gas to take place gradually and in direct proportion to the consumption, an accumulation of gas being thereby avoided. All the Dietz lamps are fitted with removable reflectors, and all side lamps with combination brackets. Samples of the barrel type of headlight were prominently displayed.

Dayton Electrical Mfg. Co.—Several new specialties made their appearance at the exhibit of this well-known house. One is a battery charger, a dynamo of the Apple type, completely inclosed. In size it is a little larger than the old Apple igniter and gives its output of current at a much slower rate, giving a 3-ampere charging rate on an 8-volt battery at 1,400 revolutions per minute. The charger is fitted with a two-inch bevel friction governor. A cut-out switch and volt meter for use with the battery charger was also shown. A new four U timer for distributing secondary current for sparking four cylinders with one coil was shown by a working model. There were also new lead bottle storage batteries that can be turned in any position without danger of spilling the liquid electrolyte which is used. A bounteous display of Apple dynamos was made.

Duff Mfg. Co.—One new single-acting jack had been added to the Barrett line of jacks which was exhibited. These jacks are of the quick-acting, automatic lowering type, and can be safely applied without having the passengers alight from a car.

W. J. Duane & Co.—The automobile tops and limousine bodies of this concern made a very attractive exhibit, the display being completed with a line of slip covers, wind shields, tire irons and upholstery materials in general. The Duane tops are used, among others, on White, Locomobile, Lozier, Franklin, Rochet-Schneider and Pope-Toledo cars.

Duplex Ignition Co.—The Duplex spark plug exhibited is an interesting device for getting a spark when the sparking points have become sooted or fouled. The novel feature of the plug is that a brass tube inside the porcelain insulation forms, with the main shell of the plug outside of the insulation, a small condenser which is not in the circuit under ordinary conditions. If, however, the plug becomes fouled and refuses to spark, a small switch handle projecting from the top of the plug is pulled up. This breaks the direct current through the central wire and brings the condenser into the circuit; the condenser rapidly becomes charged when the circuit is closed and the resulting discharge, being too heavy to be carried wholly by the short-circuiting carbon deposit, finds a path through the air across the points, making the requisite spark. Plugs were exhibited in operation; to show the effect of the condenser action, short-circuiting was effected by means of

VIEW OF GALLERY ON NORTH SIDE OF THE 69TH REGT. ARMORY SHOWING EXHIBITS OF ACCESSORIES.

wet strings, effectually stopping sparking under ordinary conditions, but not preventing sparking when the condenser was thrown into the circuit.

DIEZEMANN SHOCK ABSORBER.—A Diezemann shock absorber was shown attached to a spring and section of frame mounted on a table. Several samples of the device were at hand for inspection and the internal construction was shown by means of one of the devices made of aluminum and sectioned to one side to show the friction plates. The Diezemann is one of a large number of shock absorbers that have made their appearance during the present winter. It operates on the friction principle, a plate carrying a brass barrel being bolted to the side frame and containing a movable shaft with integral friction plates. Fiber friction discs and rings are interposed between these plates and the ends of the stationary barrel. A reciprocating arm is keyed to the rotating shaft, and at its other end is pivoted to the end of a link whose lower end is hinged to the car spring. Tension on the friction plates is maintained by a sunken screw plate that screws into the end of the barrel. The barrel is packed with grease.

EDMUNDS & JONES MFG. CO.—The full line of E. & J. automobile gas lamps, including those especially adapted to light and medium-weight touring cars and runabouts, was exhibited, together with a very handy little tail lamp, which will stay lighted. A very handy generator was also shown.

EASTERN CARBON WORKS.—At this stand there was a full line of the company's dry carbon cylinder and carbon porous cup batteries, carbon cylinders, plates, disks, boxes, rods, brushes, etc., besides pocket flashlights of various shapes and sizes. One novelty which claimed attention was a new battery connector the feature of which is a rubber washer next the knurled nut, which prevents loosening under any condition, the rubber, under the pressure of the nut, jamming so securely that no amount of vibration budges it. The company has taken out English, French, German and Italian patents on this little device, of which over 300,000 were sold in this country during 1905.

ENGLISH MERSICK CO.—Finished brass specialties, with handles, hinges and such auto hardware predominating, were shown at this stand. Strictly hand-made lamps of the new French styles, and a special railroad tail light that, it is claimed, can be seen four miles, were also exhibited, as was a new type of gas generator. Newest among the lamps were neat little incandescent roof and side lights for interior illumination of limousine and landaulet bodies. A new door lock for limousines was shown of the double acting type. Beautiful souvenirs in spun brass ash trays with match box holder in center, were given to visitors.

EDISON STORAGE BATTERY CO.—The Edison storage battery was shown complete, and in sections to show the arrangement of the parts. A number of plates and other parts were shown separately.

GRAY & DAVIS.—Six new patterns of lamps were added to the G. & D. catalogue for this year, and all were exhibited at the show. The new generator is in three parts—ash can in the bottom, carbide basket in the center fitted with a central circular inverted standpipe screen; the water tank above is supplied with cut-off. Increased economy and better service are claimed for the new generator. The new lamps are designated by the numbers 51, 55, 56, 29, 19 and 17.

HORACE E. FINE.—Metal monograms, of which this manufacturer makes a specialty, were shown. There were also displayed license numbers, lamp markers, goggles and metal polish.

A. H. FUNKE.—A new pattern of the Autolyte, an open front and open back lamp, was shown, together with five new patterns of auto horns.

GREEN, TWEED & CO.—A very ingenious lubricator in several styles has been brought out for this season and was displayed by this company. A principal feature of the oiler is that the pumps are individually removable by merely taking out half the cover of the case and sliding them out of slots in the other half of the cover; thus, with a duplicate pump in reserve, any one of the pumps can be removed and laid in the tool-box until the garage is reached. If it is desired to permanently cut off one of the leads, any of the pumps can be removed and a cover placed over its slot. A camshaft passing through the longitudinal center of the case moved the pump up and down, the plunger being stationary. This movement keeps the oil agitated. The throw of each pump is regulated by an adjustment screw, so that delivery can be varied. As the oilers are made with four and eight pumps, the number of leads can be any number from one to eight. Monitor sight-feeds and vacuum check valves are furnished with the lubricators. The oilers are made for automobile and stationary engines, the latter with two compartments, for light and heavy oils. The automobile oilers are positively driven by gears or chains.

GRAY-HAWLEY MFG. CO.—This concern exhibited Gray mufflers and signal whistles, single and chime, to be sounded by the exhaust gases from the motor. The whistles were shown connected to pumps so that they could be sounded for the benefit of prospective purchasers.

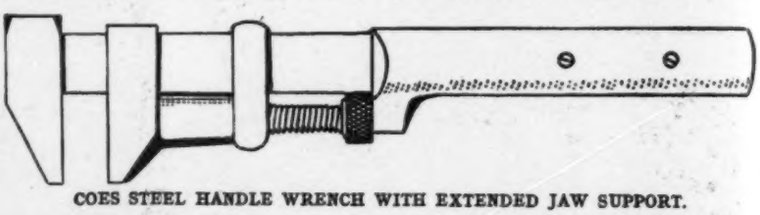
F. A. GOEBEL.—An exhibit of lock switches for automobile ignition circuits. The switch is entirely inclosed in a box-like casing with rounded corners and edges; a flat key inserted in a keyhole in the side of the switch is the only means by which the current can be turned on. The contact is of the knife-blade type. When the switch is locked the case is locked and cannot be removed.

GLEASON-PETERS AIR PUMP CO.—A variety of air pumps for tire inflation and other purposes, operated by hand, foot or power. A three-cylinder high-compression power pump was shown in actual operation, being run by an electric motor.

GAS ENGINE WHISTLE CO.—Whistles to be blown by the exhaust gas from the engine were shown in several varieties.

GABRIEL HORN MFG. CO.—Two, three, four and eight-tube chime horns to be sounded by exhaust gases from the engine formed the main exhibit. It is claimed that real tunes—in the key of C natural—can be played upon the eight-chime horn, the keyboard being fastened to the side of the body in easy reach of the fingers of the chauffeur. The Gabriel concern also demonstrated the Foster shock absorber, a device for relieving the strain on automobile springs.

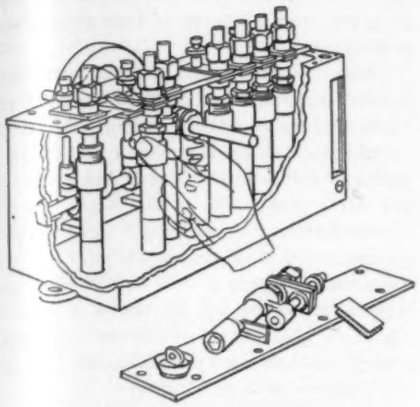
GILBERT MFG. CO.—A variety of the fabric and leather specialties made by this concern, consisting of tire cases, inner tube cases, grease bags or boots for joints, storm aprons, car covers, lamp covers, and so on.



COES STEEL HANDLE WRENCH WITH EXTENDED JAW SUPPORT.

C. T. HAM MFG. CO.—The selling agents of this concern, John H. Graham & Co., showed a full line of Ham Cold-Blast automobile lamps and oil burners that prevent the flame from being blown out and throw a brilliant shaft of light without smudging the burner or sweating the front glass. These results are obtained by the employment of the "cold-blast" principles. When cleaning is desirable, the Ham lamps can be taken apart and put together readily in a short time. Headlights, side lamps and tail lamps are included in the Ham line.

R. E. HARDY CO.—Ignition plugs for standard motors on the market were exhibited. This concern manufactures plugs in six types and forty-seven sizes. They are made with mica insulation and with porcelain cores, with American threads or with metric threads. In the porcelain-insulated plugs the porcelains are made in two pieces, so that the inner porcelain, which is considerably the hottest when in use, can expand without danger of cracking on account of the comparative coolness of the outer end. Mica plugs are made with sheet mica wound cores, the inner layer of mica being pro-



GREEN TWEED INDEPENDENT PUMP MECHANICAL OILER.

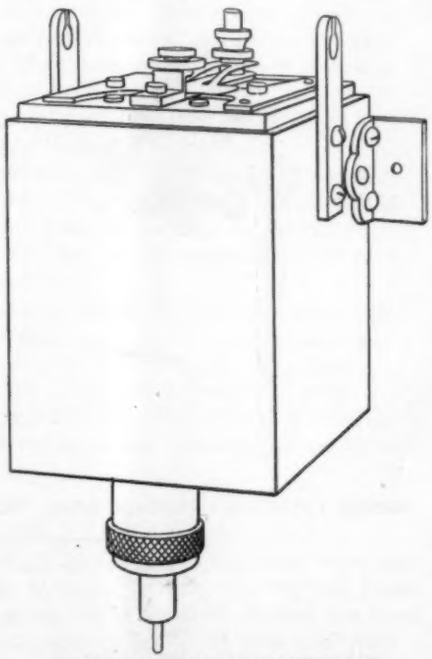
tected by mica washers. No shellac or glue is used. All Sta-rite plugs are readily taken apart for cleaning. Special terminals and clips can be supplied.

HESS-BRIGHT MFG. CO.—Non-adjustable ball bearings of the two-point bearing were exhibited in all sizes. These bearings are made in the same way and in the same styles as heretofore, except that the style known as "full-ball" bearing has been discontinued. This consisted of a solid circle of balls, as distinguished from the newer type, which has short spiral springs separating the balls. With the full-ball type a gate had to be provided for the removal of the balls; in the new type compression of the springs forms a gap which allows the relative position of the races to be shifted sufficiently to allow the balls to be removed. A number of standard transmission gears were shown fitted with Hess-Bright ball bearings. The Hess-Bright company naturally points with pride to the record of victories for cars fitted with its bearings—the Gordon Bennett, Vanderbilt and Florio cup winners being so equipped. The varied uses for the H.-B. product was well shown by the Apple dynamo, La Coste magneto, Cadillac hub, Franklin (light), Frayer-Miller, Brown-Lipe, American Locomotive Co. (Berliet) and Mack Bros. five-ton sight-seeing car transmission—all mounted on Hess-Bright bearings.

HYATT ROLLER BEARING CO.—New self-containing guide yokes have been added to the Hyatt roller bearings for this season. When the bearings are in action the projections do not touch the rollers nor interfere with the action. The difference in friction in plain bearings and the Hyatt roller bearings was forcefully demonstrated by means of two small trucks on a steel plate, each loaded with 250 pounds dead weight. Handles invited the public to "take hold," and the ease with which one truck could be rolled as compared with the other was convincing. Two heavy motor flywheels, mounted, helped along the demonstration.

A. W. HARRIS OIL CO.—The Harris Oil display differed from all the other oil and grease exhibits in that a convincing exposition of the fluid qualities of its oils for gasoline and steam engine lubrication was given by means of a polished, grooved incline down which the oil flowed from cans above into similar receptacles below, the cans being reversed when the lower ones were filled. Special cylinder and transmission oils and heavy greases for chain and gear lubrication were exhibited. Harris oils are made with special reference to the requirements of automobile engine lubrication. In the Harris line are light, medium and heavy-bodied cylinder oils, specially adapted for cold weather automobiling, splash system lubrication, motorcycle work and steam engine practice, besides semi-solid oils and greases for chain and gear lubrication.

HICKS SPEED INDICATOR CO.—A strong feature of the Hicks speed indicator made

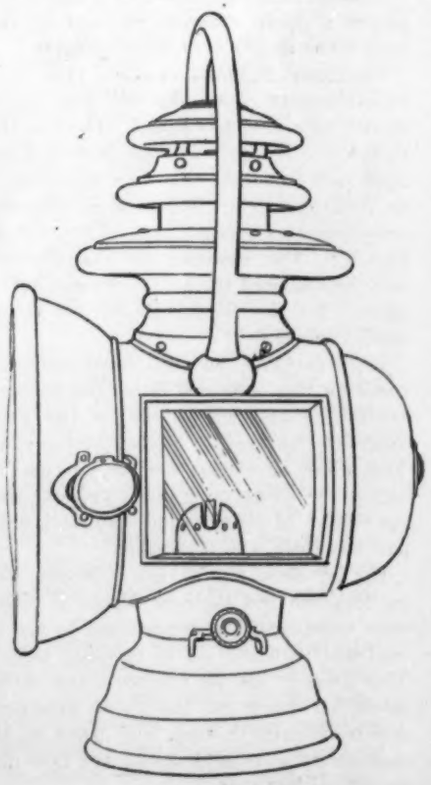


HEINZE SINGLE DASH-BOARD COIL.

by this concern is that the hand or pointer is free from fluctuation or vibration at all times, whether speed is rising or falling, slowly or rapidly. The pointer is quite stationary when the speed does not vary. The standard instrument has a rectangular face and the pointer moves over a graduated arc, with very plain figures. Below the speed scale is a total mileage odometer reading up to 99,999.9, and above the speed scale is a trip odometer reading to 999 miles; this can be turned back to zero at any time by a milled knob at the side of the case. The case is attached to the dashboard and the face is placed at an angle so that it can be conveniently read. The manufacturers state that there are but three gears used in the speed indicator mechanism.

E. F. HODGSON.—A unique exhibit made for the first time at an American automobile show was a portable garage, which was displayed in the basement of the Garden by E. F. Hodgson, of Dover, Mass. The exhibit was a full size 10 by 15-foot "Wigwarm" house made in a dozen separable sections, each constructed of light trussed wood framing sheathed with overlapping weather-boarding laid over weather-proof roofing paper. The floor was of heavy planking and had a trap door to cover a pit to be dug in the ground under the house. There were two windows in each side, one in the rear above a workbench, with lockers at either side, and one in each of the double doors. The walls of the building were surmounted by a gable roof in four sections, forming a peak in the center.

HENRY HOOKER & CO.—Three styles of auto bodies were exhibited, a side-entrance phaeton for five or seven passengers, painted automobile red, upholstered and grained leather to match, and having a victoria top covered with grained black leather occupying the position of prominence. This body was unusually long and wide back of the front seats and was provided with spacious pockets on both sides for the ception of miscellaneous small articles. Another exhibit was a limousine in the rough, which, like a landaulet, also in the rough, revealed attractive lines, substantial construction and good workmanship. The framing of both was of ash, the panels of whitewood and the window and door framing and the roof in red mahogany. The windows of the limousine dropped down on all sides into pockets. The mechanism of the auxiliary folding seats inside was ingenious; the seat was pivoted or hinged at the rear to open down, the same hinges having lever



GRAY & DAVIS OIL LAMP.

arms connected with a seat back that slid in metal slots in the paneling of the body. When the seat was let down the back slid up and its upholstering was flush with that of the rest of the body. In the landaulet the extra seat arrangement was different, the seats merely sliding forward out of slots under the front seats, and being provided with stationary iron legs fitted with roller feet. These legs are concealed from view, when the body is upholstered, by an apron or short curtain.

Hill Mfg. Co.—This concern exhibited samples of automobile tops, which are manufactured in all sizes and of all suitable materials. The Hill tops are strongly constructed and the manufacturers guarantee the fixtures and joints not to rattle.

Hutchison Electric Horn Co.—This company exhibited an automobile horn to be sounded by electricity, producing a sound peculiar to this horn. Battery current is used for sounding the horn by vibrating the reed, and pressure of a button closing the circuit.

Havemeyer Oil Co.—Havoline gear lubricating compound was shown at this stand. It is a special lubricant made for transmission gears. The Havoline fluid oils of the company were also shown.

Hydraulic Oil Storage and Distributing Co.—The Snell hydraulic system of handling gasoline and other oils by water power was exhibited.

Hatch & Brittin.—The U. S. emergency surgical case with everything requisite for first aid to the injured was shown for the first time at an automobile show. The exhibit was attractively displayed.

Heinze Electric Co.—This concern displayed a dozen different sizes of ignition coils fitted with a very rapid vibrator.

Hartford Suspension Co.—The Truffault-Hartford shock absorber was demonstrated by a mounted model. The fact that this device is used on many leading European cars has done much to popularize it in America. The device offers frictional resistance to excessive play of the springs of a car. The announcement that this concern had secured the sole American selling agency for the Gobron-Brillié car caused much comment.

Herz & Co.—The 1906 timer manufactured by this company shows the plungers set in the case instead of on the shaft. They are operated by a cam on the shaft. This gives an opportunity to the user to adjust the plungers to meet requirements. An exhibit of primary and secondary wires and terminals was also made.

Holley Bros. Co.—The well-known Holley magneto and the new Model E carbureter were capably demonstrated by the attendants, with the aid of working models. This concern had its magnetos and carbureters on many of the more prominent American cars in 1905, and 9,000 of the carbureters were sold during the first nine months of last year.

P. M. Hotchkin.—A brand new shock absorber or "anti-jolt" device in the market is the Hotchkin, which was shown and demonstrated in the Garden basement. It operates on the hydraulic principle, a circular case adapted to be bolted to either the car frame or the spring being filled with glycerin and having a check valve on one side. To a central shaft in the case is attached a moving wing or arm that forces the fluid ahead of it in either direction as the wing is moved by a reciprocating arm attached at its free end to a link connected with the frame if the case is fastened to the spring. and to the spring if the case is attached to the frame. When the frame goes down and the car spring is under tension the glycerin passes through the check valve freely, but on the rebound the check valve closes and the fluid is obliged to find its way slowly back to the other side of the valve by means of constricted passages through a stop block in the case. This checks the rebound and prevents pitching about of the body and possible breakage of the springs.

Iron Clad Mfg. Co.—Steel gasoline storage and shipping barrels, with pumping outfits, constituted the bulk of this display, a model of the pump—made by the Tokheim Mfg. Co., of Cedar Rapids, Iowa—being shown in operation. One handy novelty was an auxiliary separate tank for long-distance touring. This is made in sizes ranging from two to five gallons, and owing to the size several can be nested and stored away in a car. A handle facilitates carrying the tanks about.

Imperial Brass Mfg. Co.—The full line of Imperial specialties was shown, consisting of centrifugal and auxiliary oil pumps, automatic lamp adjusters, compound air pumps, garage pumps, pipe fittings, priming cups and brass and aluminum castings.

Janney, Steinmetz & Co.—An elaborate display of tanks in all sizes, together with a very complete display of wrenches, formed most of the exhibit of this concern. A new tire iron for setting lugs, the Hill lock valve which will cut off the supply of gasoline instantly and can be opened only by a key, and a display of tank gauges was also made.

Jones Speedometer.—An electrically lighted showcase contained fifteen different models of speedometers, odometers, tachometers and autoclocks. A new annunciator, designed primarily for use in limousines, is the latest production by Mr. Jones. It has a press-button disk with eight signals which communicate with an annunciator on the dashboard, ringing a bell and at the same time illuminating by electricity a printed signal to the driver of the car. Another new production shown was a French movement eight-day auto clock.

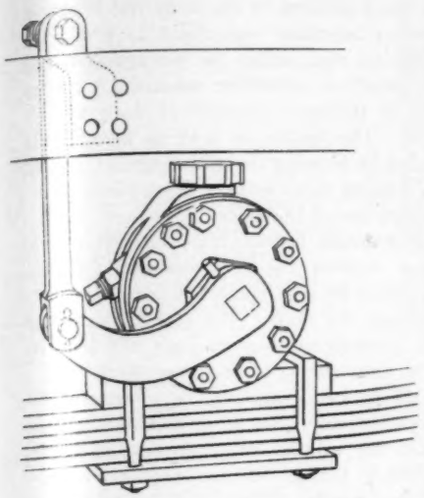
J. C. Judson Co.—Standard carriage lamps in twenty patterns were shown, and also Peerless auto-heaters, Skinner compound pumps, samples of monograms and crest engraving, a complete line of the new Scott mufflers, also the Burke climbers in over fifty sizes to cover every tire made for both pleasure and commercial vehicles. The Judson company represents the output of forty factories.

BARNES ADJUSTABLE STEERING GEAR, SHOWING COMPONENTS ASSEMBLED AND SEPARATE.

Phineas Jones & Co.—Wood, artillery type wheels shown in the white or natural were displayed, together with samples of the materials used in their construction.

Klean-All Mfg. Co.—This exhibit consisted of the special soap called Klean-All, intended for the use of automobilists or others whose sport or business brings them into contact with grime or dirt. The soap is said to be a vegetable compound, harmless to the skin but efficient as a dirt remover.

Kinsey Mfg. Co.—Radiators for water-cooled gasoline motors and mechanical oilers were exhibited by this company. The radiators are made with flat, vertical tubes 3 1-2 inches wide with a water space of 3-16 inch; this construction makes a radiator which, the manufacturers state, will not easily burst when the water is frozen, as the walls expand instead of cracking. Fins with large radiating areas are placed on the tubes. The Kinwood mechanical oiler



HOTCHKIN SHOCK ELIMINATOR.

also shown is of the type in which each feed has a separate pump. The pumps can be worked individually by hand if desired.

KILGORE AUTOMOBILE AIR CUSHION CO.—The Kilgore pneumatic shock eliminator made its first show appearance this year, and attracted much attention. It is substantially made of drawn brass cylinders with a strong plunger that moves up and down with the action of the spring, compressing the enclosed air at the ends of the cylinder and cushioning excessive jolts.

KIRKHAM MOTOR MFG. CO.—Single, double cylinder air-cooled and four-cylinder water-cooled motors were exhibited by the Kirkham company. The smaller sizes are for motorcycle use, or other purposes where a light, air-cooled motor is desirable. An interesting engine is the two-cylinder motorcycle engine with cylinders placed at a V angle and having the connecting rods working on a single crank. This has a bore of 3 inches with 3 1-4-inch stroke, and develops 5 horsepower at 1,800 revolutions a minute; the weight is 64 pounds.

W. J. KELLS MFG. CO.—Five forms of cellular or honeycomb radiators, three styles of hinged hoods, a copper riveted gasoline tank of large capacity and pressed sheet steel mud fenders were shown by this company. As a novelty, a section of fin tube coil radiator was displayed.

JULIUS KING OPTICAL CO.—A large line of auto goggles and everything pertaining to this line of specialties was shown.

FRIED. KRUPP CO.—This famous German concern showed a line of special grades of steel in axles, shafts, gears, etc. It was represented by Thomas Prosser & Son, of New York.

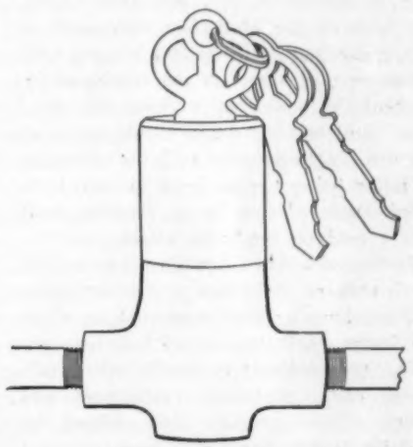
LACKAWANA LEATHER CO.—A fine display of chrome-tanned body trimming and top leathers in all shades was made. The samples were large and hung over a rack in neat folds.

LOCK-SWITCH MFG. CO.—An electric lock switch, designed to prevent the theft or unauthorized use of a car was the specialty shown. This concern also demonstrated its tire pressure indicator to prevent over-inflation and unequal pressure on the tires of a car.

LUNKENHEIMER CO.—The operation of the lubricators made by this concern was well shown by a six-feed oiler in constant operation. The Lunkenheimers are now supplying the Locomobile Company with three-feed and six-feed lubricators and the Peerless concern with the six-feed type. A comprehensive display of the big line of oil pumps, valves, oil and grease cups, spring key cocks and chime whistles made by the company completed this interesting exhibit.

LIGHT MFG. & FOUNDRY CO.—A very interesting exhibit of many aluminum, manganese, bronze and phosphor bronze castings that enter into automobile construction. The growing use of aluminum and bronze in this connection made the display doubly attractive.

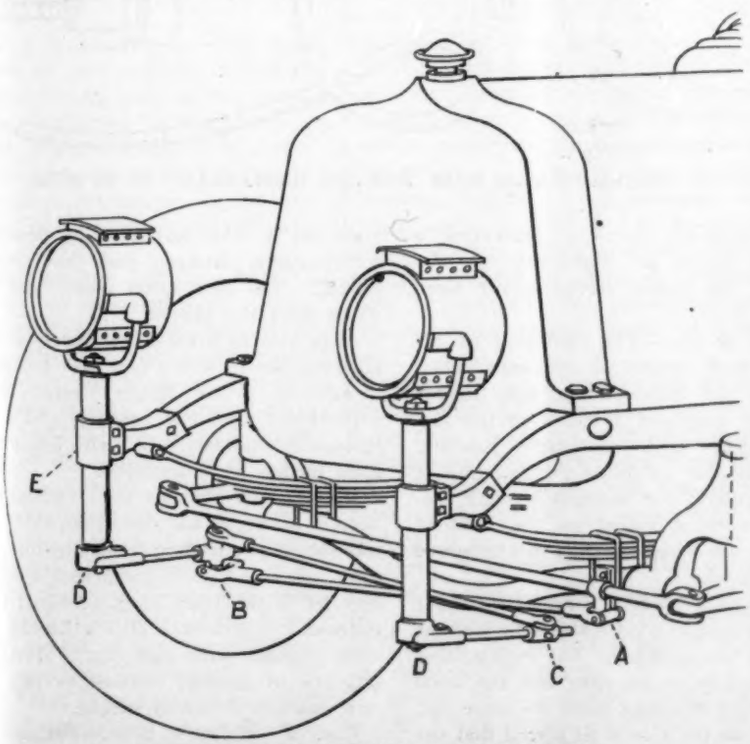
MOTOR CAR EQUIPMENT CO.—A variety of automobile accessories and attachments, including the ignition apparatus manufactured by the Connecticut Telephone & Electric Co. and the Continental Calliope—a chime signal horn blown by the exhaust. The company also showed a French siren horn operated by a friction pulley brought into contact with the engine flywheel and producing a sound which cannot be ignored. Continental lamps, Blanchard horns, of which the company has exclusive control in America, Geecee batteries and an electric drill were also exhibited. Importations of the French Alpha lamps and a special line of Italian rubber and cambric faced cables were shown. Among the prominent features was the new Coes steel handle wrench with bar and head piece in one solid forging. They are made from 6 to 21 inches in length, the 12 to 21 inch sizes having ball bearing screw.



HILL GASOLINE LOCK VALVE.

MANUFACTURERS' CAN CO.—This firm manufactures for the trade only, its product consisting of receptacles for oils and greases, the receptacles being suited to their contents. Oil cans, for instance, are made with faucets through which the oil can be drawn off and with handles for convenience in carrying; the shipping crates are so made that they can be used for stands.

MANUFACTURERS' FOUNDRY CO.—Cylinder castings completely machined and tested are the specialty announced for this year. A beautiful example of cylinder grinding was exhibited. The cylinder was cut in half lengthwise for observation purposes.



IMPERIAL-LYON AUTOMATIC LAMP ADJUSTER.

A, Knuckle rod clamp. B, Gear rod double clamp. C, Gear rod single clamp. D, Barrel. E, Barrel clamp.

Castings in all stages of finish were also shown.

MIDVALE STEEL CO.—Midvale automobile steel, a product of this company, made especially for use in automobiles, was shown in many forms, the display of gears being particularly effective.

MIDGLEY MFG. CO.—Pressed steel automobile wheels that look exactly like the wooden article when finished were shown in various sizes, and a display of component parts in all stages of finish was made. The Midgley company also makes the new Dunlop universal rim for wood or steel wheels.

L. J. MUTTY CO.—Samples of high-grade rubber cloths were shown. A specialty was a double texture mackintosh cloth for automobile tops, curtains, etc.

MCGIEHAN MFG. CO.—Plain odometers, combined trip and total odometers and combination odometers and speed indicators were exhibited at the McGiehan stand. The form of the McGiehan instrument is rectangular, the speed pointer playing over a semi-circular scale; in the combined instrument the odometer is above the speed scale. Still another model combines speed indicator, total odometer and trip odometer, the latter being turned back to zero by a milled knob. Drive is by flexible shaft from a gear on the front wheel.

MANHATTAN AUTO TOP CO.—The exhibit by this concern comprised a "Perfect" overhead revolving washer supported on a gas pipe frame, several styles of four-bow extension tops covered variously with khaki colored cloth, pantasote, mackintosh and leather. The company also showed an enameled leather hamper of large size and brass monogram. A small but leading feature was a Heath "dry gas" carbureter, floatless and having a wire net cage with a small fan in the bottom mounted in the upper part of the cylindrical barrel. The arrangement is such that the inrushing air rotates the wire cage and breaks up the gasoline particles to more thoroughly commingle them with the air molecules.

CHARLES E. MILLER.—One of the most extensive displays of automobile accessories was made in the Armory by this pioneer importer and dealer. It includes tires and tire attachment such as anti-skid treads and Weed tire chains, gas and oil lamps, pumps, spark plugs, a large assortment of tools, horns, sirens, chains and similar articles. Especial attention was called to the ability to supply imported horns and Brampton chains at prices on a level with the domestic goods. An interesting novelty for the car owner was a combination siren and reed horn, just added to the big Miller stock. This has a bulb and flexible tube and a reed in the horn like an ordinary horn to be operated with the hand, and in addition a rotating aluminum wheel with suction air ports constituting the siren feature. The rotating wheel is driven by a flexible shaft having a pulley which is carried at the end of a short spring in such a position that it can be depressed by the foot into contact with the engine flywheel. When in motion the rotating wheel draws in sufficient air to sound the horn, the note varying with the rate of revolution. The horn proper has three turns and an ovate bell, gauze protected. A specialty of particular interest to garage managers was a combination tool cabinet and workbench. This was of oak, strongly built and having various drawers and cupboards equipped with about 250 small tools of all sorts generally needed in a repair shop, each tool having a special place provided for its keeping. A special locking mechanism was fitted to lock all the drawers simultaneously when the key is turned in the main door of the cabinet. Mounted on top of the bench was a small electric lathe and a vise. The cabinet legs were fitted with rollers so that the cabinet can be rolled readily about the floor into any desired position, when by depressing a pedal the rollers are withdrawn into the legs and the cabinet settles into a fixed position.

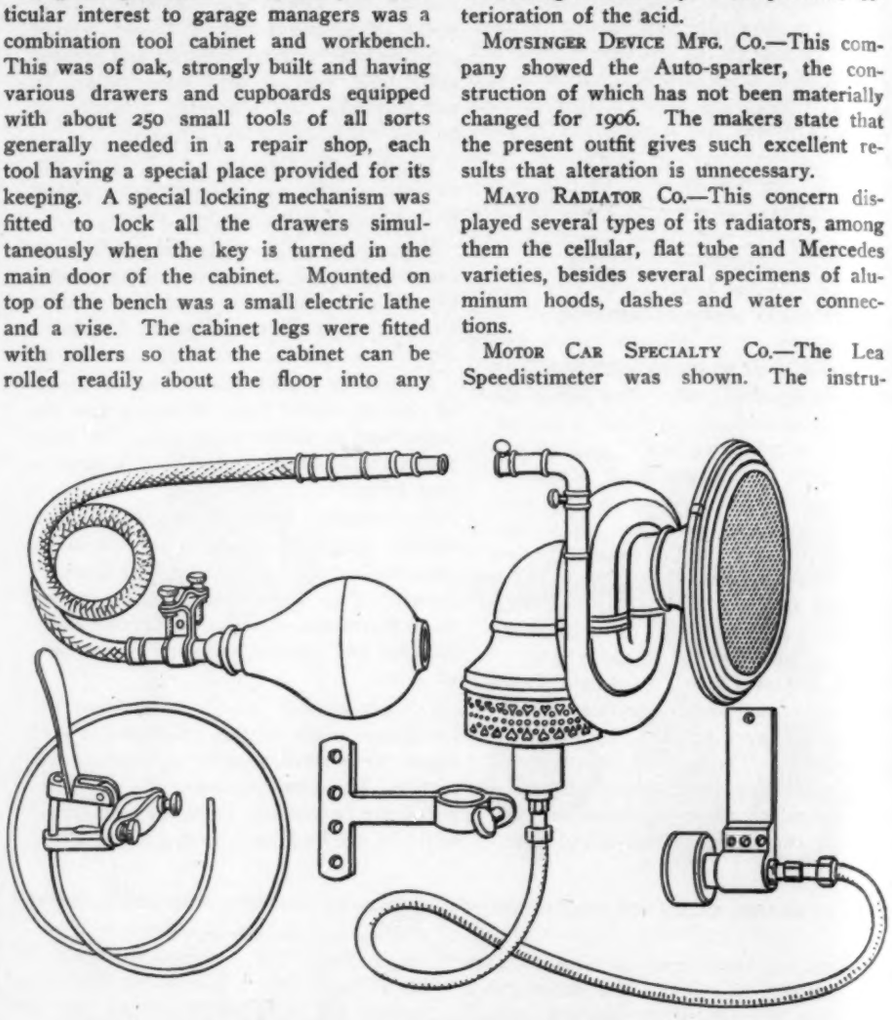
MCCORD & CO.—The operation of the five, six and seven-feed McCanna lubricators of this concern was well demonstrated by means of a model of the six-feed variety kept constantly running. There was also exhibited the full line of McKim gaskets for automobile work, besides a working model of the Hibbard automatic tire pump attached to a mounted automobile wheel.

MINIMAX CO.—A conical fire-extinguisher possessing several good features formed the exhibit of this company. The extinguisher has the nozzle at the apex and the usual bottle of acid in a cage inside the large end. A handle on the side is so placed that the apparatus is readily manipulated; in case of fire a plunger in the large end is struck against anything convenient to break the bottle of acid within the extinguisher, and the nozzle is pointed at the fire. A stream can be thrown a distance of thirty to fifty feet. The bottle of acid is hermetically sealed by blowing the glass together, so that no corking is necessary. This prevents deterioration of the acid.

MOTSINGER DEVICE MFG. CO.—This company showed the Auto-sparker, the construction of which has not been materially changed for 1906. The makers state that the present outfit gives such excellent results that alteration is unnecessary.

MAYO RADIATOR CO.—This concern displayed several types of its radiators, among them the cellular, flat tube and Mercedes varieties, besides several specimens of aluminum hoods, dashes and water connections.

MOTOR CAR SPECIALTY CO.—The Lea Speedistimeter was shown. The instrument has a clock movement, by means of which speed, distance and time are recorded. The Lea speed meter and tire-pump were also shown.

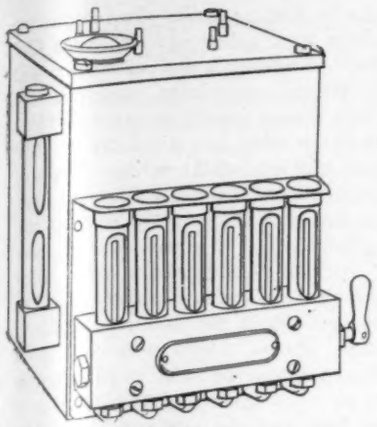


MILLER COMBINATION SIREN HORN OPERATED MECHANICALLY OR BY BULB.

A. R. MOSLER & CO.—The Spit Fire spark plug was shown with a new fiber protector; in addition, a new Mosler eccentric timer with Hess-Bright ball bearings and a new transparent dashboard coil with heavy plate glass facings were displayed.

MANHATTAN STORAGE CO.—The majestic lamp in ten styles and more than forty sizes was shown as a leading feature by this company. A new type of lamp with a special lens set in the front glass attracted much attention. There was also a line of Majestic clincher tires and tubes. The general line of supplies handled by this concern was also shown by sample.

WM. P. MILLER'S SONS.—Perhaps the most interesting of the various oils and



HILL OILER WITH SIX SIGHT FEEDS.

greases exhibited by this concern is a grease which, the manufacturers state, is entirely unaffected by changes of temperature within a range from zero to 200 degrees Fahrenheit, so that it will not be melted out of grease cups by ordinary bearing temperatures, and will not become too hard to work properly when cold. Other oils and greases are also manufactured for all kinds of automobile work—special lubricants for special purposes. A dressing for friction drives and for motorcycle belts is a specialty.

MORGAN & WRIGHT.—An exhibit of the full line of M. & W. tires, with the usual sections showing their construction, and tools for their removal and attachment.

NATIONAL CARBON CO.—A new dry battery cell was shown—the Columbia igniter—designed especially for four-cylinder engines and made in all sizes and at same prices as the regular Columbia line. A display of small incandescent hand lamps was also made.

N. Y. & N. J. LUBRICANT CO.—Non-fluid oils in all sizes of cans ready for immediate use were piled ceiling high at this stand. Great economy is claimed for this lubricant, as it does not drop and waste, while, unlike greases, it does not require the bearings to grow warm before lubricating. A non-carbonizing gas engine cylinder oil was also shown.

NEW YORK CARRIAGE TOP CO.—An Empire extension top was shown on a side-entrance phaeton body, both finished in black. The top had pantasote covering, polished brass joints, and bows covered with hand-buffed bow leather. A beveled plate glass wind shield with mahogany frame formed part of the outfit. The side and rear curtains had large celluloid lights. Samples of cover pantasote in three colors and half a dozen samples of mackintoshed cover cloths were also displayed.

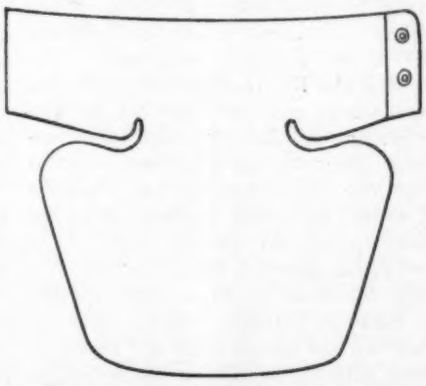
NEW YORK SPORTING GOODS CO.—The automobile supply department of this house had a varied exhibit of auto horns, lamps, clothing and novelties in accessories.

NATIONAL SALES CORPORATION.—A varied assortment of specialties was exhibited, among which were the G. C. dry storage batteries and individual charging outfits for direct-current voltage; Connecticut coils in box and dash types in various sizes, new coil current indicator, ampere and volt meters, Dodge lubricator with positive time, and Metzger Sootproof plugs.

NOERA MFG. CO.—Compound automobile pumps, oils, guns, and oil cans big and little, constituted this exhibit, which was plentiful in range of samples and variety.

NATIONAL BATTERY CO.—Storage battery cells for electric vehicle service were shown, together with storage batteries for every service, sparkers for ignition, etc.

NONPARIEL MUFFLER CO.—In addition to a muffler, this concern exhibited a small water pump, to be operated by steam or compressed air. Its special feature is that it contains no moving valves, the pistons and plungers being drilled with holes which, alternately covered and uncovered, act as valves. The pump has a maximum capacity



SCOTT MUFFLER AND CHEST PROTECTOR.

of 3 1-2 gallons a minute, weighs twelve pounds, and is especially adapted to steam cars and other small steam plants.

F. W. OFELDT & SONS.—The Ofeldt water tube steam generator for steam cars was demonstrated in operation with an Ofeldt kerosene burner, the steam generated being used to drive a three-cylinder compound horizontal engine. The generator and burner were encased in a galvanized cylinder having a mica window in front, through which the blue flame of the burner could be watched. No perceptible odor emanated from the vent above the generator.

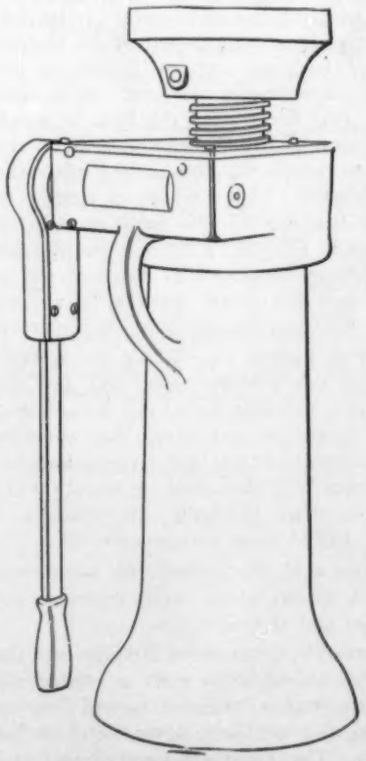
OLIVER MFG. CO.—The Peerless automobile jack, made by this company, was shown in five sizes. W. L. Ash, president and general manager of the Never-Miss Spark Plug Co., of Lansing, Mich., was also at this stand, which he made his headquarters for meeting his eastern customers.

PARISH & BINGHAM CO.—This concern showed specimens of the frames it supplied for the Peerless, Pierce-Arrow, Stevens-Duryea and Maxwell cars, besides brakes and clutches in the rough.

PREST-O-LITE CO.—Tanks manufactured and filled with compressed acetylene gas by this company are too frequently seen on automobiles to require extended mention, and their use is so simple as to be obvious. A tank full of gas, a valve, and a hose connection to the lamp constitute the entire apparatus; a special key is provided for turning the valve, so that it cannot be tampered with. A pressure gauge sunk in one end of the tank shows the amount of gas remaining at any time. Prest-o-lite tanks are made in two sizes, holding respectively 40 cubic feet and 70 cubic feet of gas. Tanks when empty are exchanged for charged tanks at a moderate cost. The factor of safety combined with its non-freezing quality has made this tank a favorite means of automobile illumination, especially in sections where extreme winter weather is to be expected.

PITTSFIELD SPARK COIL CO.—Pittsfield coils, ranging from two to six units, commutators and Jewel spark plugs in profusion were shown. The exhibit was varied and extensive and well displayed. The company has entirely recovered from the disastrous fire of last February, which entirely destroyed its plant.

POLYPHASE IGNITION SYSTEM CO.—Two high-tension magnetos with non-vibrating single condensing coil and spark plugs, and one low-tension magneto with make-and-break sparking mechanism were on exhibition. These generators, which the company has just perfected and is preparing to place on the market, are of the induction type, having no moving wire and no contact brushes; the H armature is the only moving part. It lies diametrically through the center of circular magnet built up of two steel ribbons wound like a clock spring with insulation between the windings. The



ROTH HEAVY-DUTY JACK.

construction is such that there are two paths through which the lines of magnetic force may travel, the current taking the path of least resistance when the armature is in a position where the resistance in the other path becomes high. This overcomes any destructive breaking down effect in the magnet from the intensity of the resistance. The armature shape is dissemmetric and causes the magnetic strength of the field magnet to increase when the armature is in operation. The primary current is interrupted by a breaker positively operated by cams and working in an oil bath. The energy of the primary current is thrown through the primary wire of a special induction coil or step-up transformer. The high tension current is distributed by a timer mounted on the body of the igniter and gear driven, the gears running in oil. The entire generator, including breaker and distributer, are encased in aluminum, with cover plates arranged to be easily removable and give access to the parts. The armature shaft is either gear or chain driven.

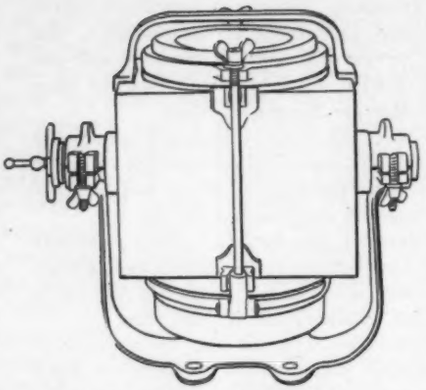
PANTASOTE CO.—A feature of this exhibit was an improvised aquarium to demonstrate the waterproof qualities of Pantasote, a large piece of which was placed on a topless square table, the resulting depression containing several gallons of water in which a dozen goldfish were swimming. The aquarium remained undisturbed during the entire week without saturating the undressed side of the pantasote. An adequate representation of Pantasote cloths, in various colors for automobile upholstering, was made.

POST MFG. CO.—The leatherless "Coat of Mail" tire protector was shown. In its particular sphere it was the hit of the Garden show. The protector consists of an envelope of rubber fabric and small steel plates, that fits around the tire, to which it is vulcanized, the armor getting all the wear to which the tire would otherwise be subjected. The envelope is molded to fit the tire exactly, the tread part being built up to five-ply of fabric. The flexible steel armor, composed of small plates, is fixed upon this tread, resulting in an unpuncturable and non-skidding tire protector.

POST & LESTER CO.—Motor car specialties for the jobbing trade and for the consumer, including Volier and Rival horns, Royal lamps and generators, four varieties of auto clocks, French and German goggles, voltmeters and ammeters, a large variety of spark plugs, Watertite tire jackets, and a large list of other standard articles.

WILLIAM M. POZ.—Rubbasilk automobile coats, a special brand, were shown in six varieties and several colors.

PATTERSON, GOTTFRIED & HUNTER.—In the new specialties shown were a broken tap extractor and a patented curved bearing scraper, also the Giant silver metal ratchet wrench. The Twentieth Century tool-box, a circular box with drawers in it, and the



ROSE SAFETY GAS PRODUCER FOR THREE LIGHTS, HUNG ON TRUNNIONS AND DETACHABLE.

Ellis off-set, adjustable S wrench, were among the latest novelties.

ROSE MANUFACTURING CO.—New patterns of Neverout lamps on exhibition consisted of a condenser mirror lens headlight made in two sizes—No. 144 with 11 1-2-inch face and No. 140 with 9 1-2-inch face—new pattern gas side lamp No. 145 and new pattern tail light No. 146. The new Miracle generator has a mechanical water cut-off and a purifying plug that filters the gas, so that the turner produces an exceptionally white and brilliant light. The water drops upon the outside surface of a conical shell which covers the carbide. The water is distributed equally over the conical surface on all sides and comes in contact with the carbide at the bottom of the shield.

RANDALL-FAICHNEY CO.—The oil guns and grease guns exhibited by this concern are made without packing, the plungers being entirely of metal and ground to fit the cylinders with accuracy. They can be used not only with oil, light or heavy, or with grease, but with fluids as "thin" as gasoline, and are guaranteed not to leak. The manufacturers have had long experience in making surgical syringes and the like, and apply the same workmanship and facilities to the manufacture of their oil and grease guns.

RANDS MFG. CO.—Eight Rands standard tops were shown in as many colors of real and imitation leather and foreign and domestic fabrics. A feature of these tops is the seamless steel tubing bow sockets, so swedged as to give a good taper, resulting in an exceptionally light and strong top. These tops are used on the Thomas, Olds and Stevens-Duryea cars. This concern is making a specialty of concealed body irons, the use of which adds much to the appearance of a car. These irons are at present used on Thomas, Pope, Olds, Aerocar, Berkshire, Waltham and Rambler cars, and the field is widening rapidly.

REMY ELECTRIC CO.—A working model of the Remy high-tension alternating current magneto attracted the public to this display. The automatic magneto dynamo igniter of the same company was also shown.

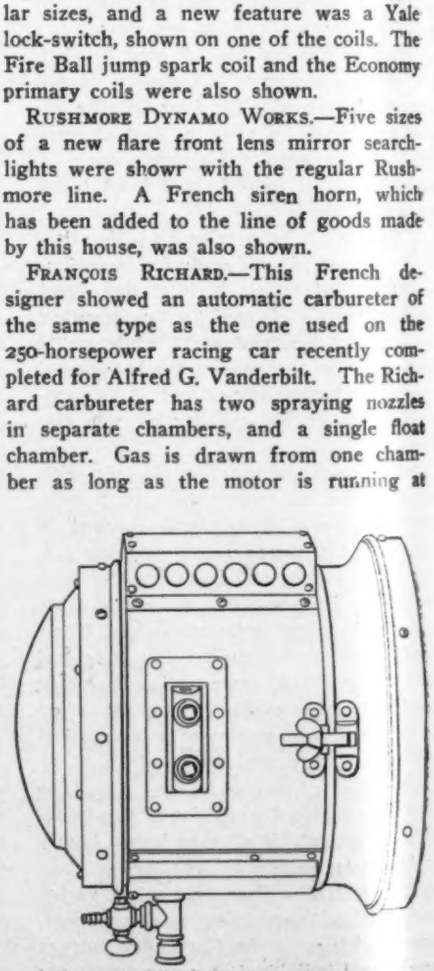
RAILWAY APPLIANCE CO.—Two interesting specialties were exhibited: the "Auto Cle" is a form of wrench which has become well known for its convenience, consisting of a steel rod with a handle at one end and a socket at the other into which can be fitted heads to take nuts of the various sizes used on automobiles. There is a universal joint, so that awkward places can be reached, and a lengthening bar. Ten nut sizes are provided for, and there is also a screw-driver bit; the set is packed in a leather case. The second specialty is the Stanwood automobile step. This is of steel strips corrugated and fastened together, the strips standing edgewise. The surface gives a good grip to the foot, and the openings allow dirt, water or snow to fall through.

LEON RUBAY.—A specialty was made at this stand of exclusively imported ignition material made by Lacoste et Cie., of Paris, France. It consisted of high and low tension magnetos, induction coils, commutators, insulated wire and spark plugs. In the line of new fittings there was shown an annunciator for closed cars, with printed lighted signals on the dash. The Edo, a new spiral spring compensator for jolting, and the Durandel tire protector, were shown as the latest novelties.

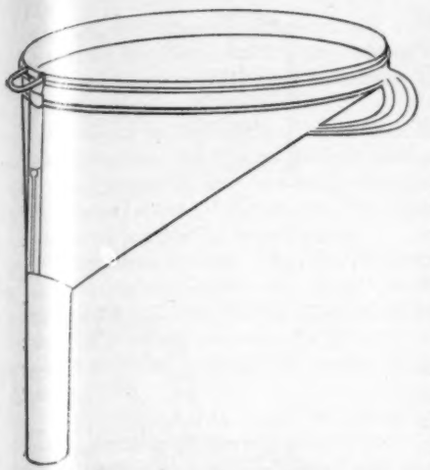
WILLIAM ROCHE DRY BATTERY CO. AND N. Y. COIL CO., INC.—The New Standard dry batteries were shown in all the regular sizes, and a new feature was a Yale lock-switch, shown on one of the coils. The Fire Ball jump spark coil and the Economy primary coils were also shown.

RUSHMORE DYNAMO WORKS.—Five sizes of a new flare front lens mirror searchlights were showr with the regular Rushmore line. A French siren horn, which has been added to the line of goods made by this house, was also shown.

FRANÇOIS RICHARD.—This French designer showed an automatic carbureter of the same type as the one used on the 250-horsepower racing car recently completed for Alfred G. Vanderbilt. The Richard carbureter has two spraying nozzles in separate chambers, and a single float chamber. Gas is drawn from one chamber as long as the motor is running at



RUSHMORE FLARE-FRONT SEARCHLIGHT



STEVENS GASOLINE FUNNEL WITH FLOAT INDICATOR TO SHOW WHEN TANK IS FULL.

moderate speeds, but for higher speeds both chambers are drawn upon.

ROTH JACK & TOOL CO.—What is claimed to be the largest stock jack ever made was shown by this house. It is 32 inches over all, with 24-inch lift, and has 40 tons capacity. All jacks shown had bronze gears instead of steel.

STEVENS & CO.—This firm showed horns, flexible tubing and generators, all of its own make. A new dragon type of horn has been added for the season. A line of tool accessories for which the company is selling agent, was also shown.

EDWARD SMITH & CO.—A complete line of sample varnishes, japans and colors for automobile work comprised the exhibit.

SPRAGUE UMBRELLA CO.—The Sprague exhibit included various sizes of extension tops and canopies for large cars and runabouts, with the Sprague patent glass fronts in mahogany, oak, cherry and sycamore; celluloid front lights, whipcord, rubber and imitation leather covers. A display of rubber duck cover slips completed the exhibit. One of the features of the Sprague extension tops is the hood effect at the front; this consists of a downward extension of the top, which serves not only as additional protection to the occupants of the car, but also conceals the front curtain when the latter is rolled up, giving the top a neat appearance. The celluloid lights are transparent and flexible.

STANDARD ROLLER BEARING CO.—A comprehensive showing of the special ball and roller bearings for automobile use for which this concern is noted was made.

SHELBY STEEL TUBE CO.—In a handsome frame made of cold-drawn, polished, seamless steel tubing were shown, in section, many samples of this company's product in round, oval, D, square and polygonal shapes. Several specimens of heavier tubing designed for axles, etc., are also exhibited.

STANDARD WELDING CO.—This year's new products of this company included a complete line of electrically welded steel rings, all sizes being represented. These rings are cut from the flat stock to the proper sizes, and the joints are made by a special process of electric welding. There was also a complete display of steel rims and other automobile parts, all welded by the company's process.

STEEL BALL CO.—Hill Precision Oilers, made without valves, have a new constantly visible sight feed this year which enables the driver to see from his seat each and every separate discharge of oil through the severed leads. In the individual glass tubes of the feed a perforated aluminum float is held in place, resting on the inlet pipe, and with each discharge of the oil the float jumps upward to a height in the glass corresponding to the quantity used. These sights are not placed on the oiler itself, but on the dashboard of the car. The new Krolz axle and universal joint, fitted with brake adjuster, was also shown, together with a new locking and reserve device for gasoline tanks. The Nomrah tire protector was also displayed.

C. F. SPLITDORF.—A complete exhibit was made of the well-known Splitdorf box-type coils, suitable for one-, two-, three- and four-cylinder engines. Long and short motorcycle coils, a new Yale lock switch and new magneto were also shown. The latest wood to be used in coil boxes—birdseye maple—was very effective. A new commutator with a ball-bearing shaft, and a new two-point switch, were among the novelties shown for the first time.

SMITH & MABLEY.—Imported lamps and tires were displayed, including the Billy line of "phares" and Hercules non-skidding tires.

SPRINGFIELD METAL BODY CO.—Two handsome folding tops were exhibited by this concern, both with front straps for holding the top in position. Among the materials used in the manufacture of Springfield tops is a special fabric which is very durable and is waterproof without containing any rubber and can be easily cleaned. Real and imitation leathers are said to be very popular with buyers of cars for 1906. Since the introduction of Springfield tops in 1903 the business has grown enormously, and a new addition to the factory just completed contains 38,000 square feet of floor space. Aluminum bodies, hoods and fenders were also shown.

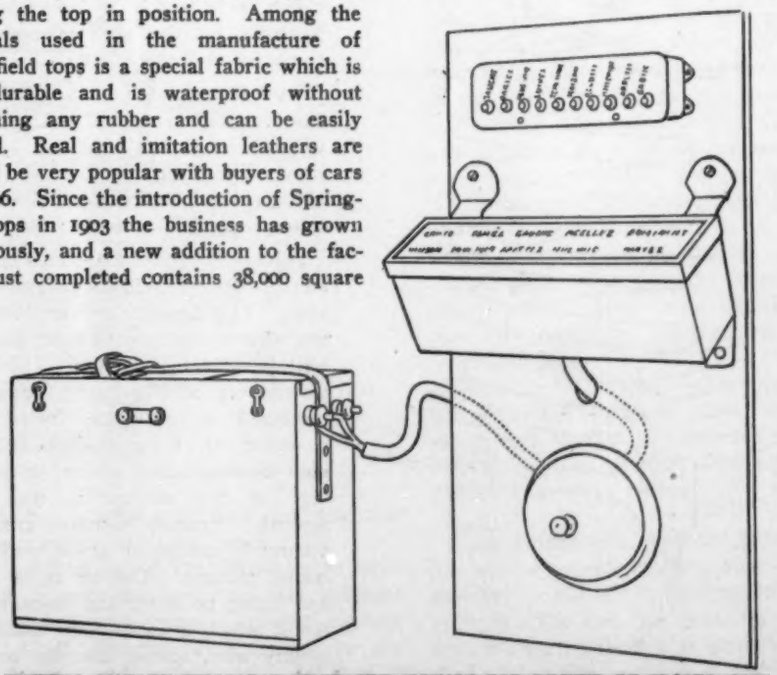
SPICER UNIVERSAL JOINT MFG. CO.—This concern manufactures fifty-one different sizes and models of this universal joint, which is of the ball-and-socket type. Several of them, more particularly adapted to automobile usage, were shown. They are water-tight and dust-proof.

SCHWARZ WHEEL CO.—Besides a comprehensive display of the Schwarz wood interlocking-spoke artillery wheels in separate parts and completely assembled the Globe automobile jack, manufactured by the Globe Jack Co., of Philadelphia, was exhibited. This jack is a light but powerful lifting device, and its simple and positive action seems to impress the onlookers.

SOLARINE CO.—A new black liquid metal polish was shown here. It is made expressly for polishing gold, silver, brass, aluminum, harness and carriage trimmings. Being black, it does not discolor the ornaments and filagrees, nor the enameled and highly polished leather surfaces. The regular Solarine Polish was also shown.

SHEDDEN MFG. CO.—The Sheddan shock absorber, exhibited at this stand, consists of a special form of air dashpot for checking the excessive motion of the automobile body on its springs, preventing spring breakages and making the car ride more comfortably. This device is made either in brass or steel, as may be desired, and in two sizes, one for cars up to 1,400 pounds weight and the other for heavier machines.

SAFETY ELECTRIC ELEVATOR CO.—A working model of a novel safety electric elevator was shown by this firm. The device might well be called an automobile elevator, for it carries its own electric motor under the floor. The shaft, placed vertically, rotates a large drum having formed on its peri-



SMITH & MABLEY INDICATOR WITH TEN SIGNALS FOR DRIVER OF CLOSED CAR.

phery a worm or screw thread engaging with a series of rollers pivoted on the elevator guides, the thread passing between rollers which thus act as a nut, so to speak, and the elevator is screwed up and down when the motor is put in motion. The manufacturers claim absolute safety, simplicity and no greater cost than other forms.

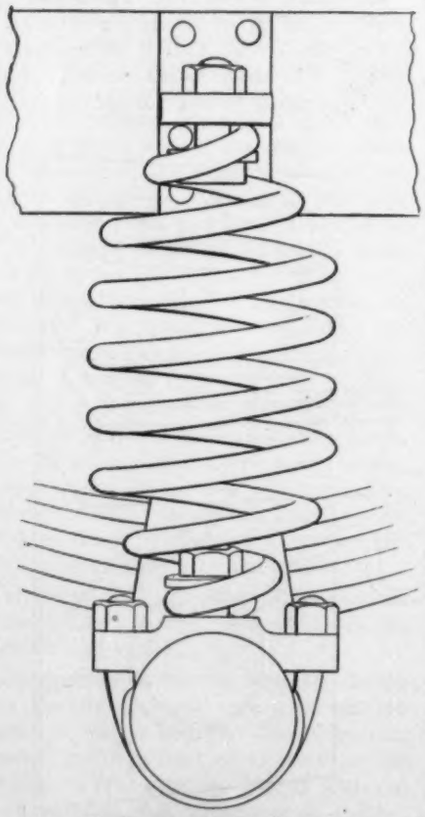
Sibley & Pittman.—This firm makes Climax auto lamps and Climax battery cells, and showed a complete line of each. The firm which also imports and sells automobile supplies, showed a large variety of specialties.

Semi-dry Battery Co.—Dunn cells and Semi-dry cells were shown in the standard sizes. This company makes but one grade and states that it destroys all "seconds."

R. H. Smith Mfg. Co.—This firm, which hails from Springfield, Mass., exhibited a working model of a speedometer actuated by an electric motor. This speed meter is new on the market this year. An interesting feature of the exhibit was the removal of a portion of the outer casing which permitted the visitor to have a "look-in" at the working parts in motion.

J. H. Sager Co.—The Sager equalizing spring, so designed and placed that it acts in the capacity of both a compression and tension spring was exhibited.

Springfield Auto Top & Upholstering Co.—Two styles of extension tops with side curtains, mahogany-stained ash bows, polished brass joints, composition metal bent bow slat irons and imported waterproof mackintosh cloth constituted the principal display. The storm apron in front had celluloid lights of generous size, while the side and rear storm curtains were similarly lighted. Another exhibit was a three-bow runabout, top covered with imported pantasote in black.



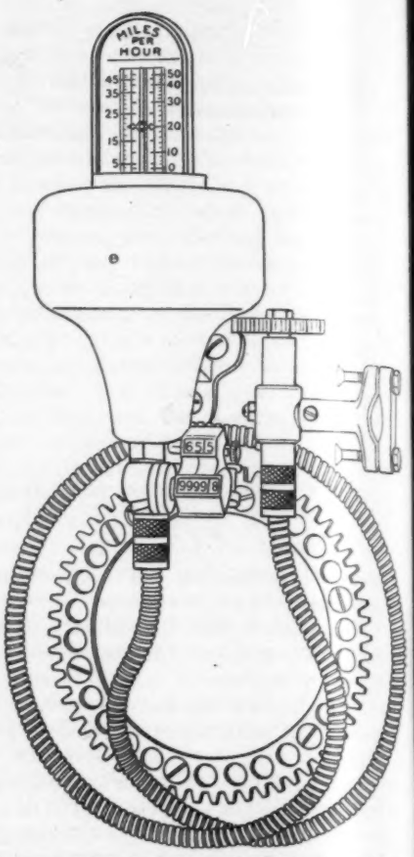
SAGER EQUALIZING SPRING.

Wheeler Mfg Co.—Seven Rands extension auto tops were shown, embracing several Winton, Thomas and Olds styles, covered in canvas, pantasote and rubber cloth. The tops were variously fitted with brass-plated, japanned and nickel-plated sockets and joints.

Timken Roller Bearing Axle Co.—At the front of this exhibit were shown eight different sizes of hubs, ranging from runabout to truck, all equipped with the Timken roller bearing, the easy running of which was demonstrated by the passing crowds keeping the wheels constantly spinning. At the rear of the booth complete axles and bevel gears similarly equipped were shown. A new axle, fitted with these bearings and known as the Hedgeland solid anti-skid auto axle, was also shown. It is a solid driving axle designed to replace differential gears, giving a positive drive to both wheels. In rounding a curve, when the outer wheel is called upon to exceed the speed of the inner wheel, it automatically disengages and runs free of the axle until the axle catches up with it, when it again engages. The axle is a continuous steel shaft. The clutch is a nut, threaded interiorly to engage the thread on the shaft. It locks the wheel to the axle and releases it automatically by riding out or in on this thread. A small tension collar is put in for the purpose of counteracting the friction between the screw and the nut, and gives the nut a tendency to draw into engagement. The clutch is not, strictly speaking, a friction clutch, as a wedge is driven into its seat instantly by the positive action of the screw, so that there is no slip.

Teel Mfg. Co.—A neat and effective tire case for the protection of the spare tire when touring, was exhibited by this concern. The Teel case can be quickly and easily put on or taken off the tire, and is waterproof. No lacing is required.

Uncas Specialty Co.—This concern had an attractive exhibit of ignition apparatus. The Leavitt primary and secondary timers and distributers shown were well finished instruments. The secondary distributers and primary circuit maker, combined in a single instrument, has a space of 1 1-4 inches between the high-tension contact points, so that "creeping" of the current is well provided against. Primary contacts are made by accurately machined cams working on a spring plunger. The casing is cylindrical and highly polished; the cover, in the center of which is carried the leading-in secondary wire, screws into the body of the case, making the instrument tight and dust-



SPRINGFIELD SPEED INDICATOR AND TRIP AND TOTAL ODOMETER COMBINED.

proof. The central contact is made by a steel ball pressing on the center of the shaft which rotates the distributing arm. In the Leavitt primary timers a single cam comes into contact successively with steel balls backed by spiral springs, making a positive and accurate contact.

Utility Company.—Gre-solvent, which is claimed to be "miles ahead of soap," for removing grease and grime, was shown, and samples were distributed.

Veeder Manufacturing Co.—A new tachodometer was shown, the latest addition to the line of Veeder specialties. A full display of odometers and tachometers were on exhibition attractively arranged in showcases, but the feature of the exhibit was the working models of all these in full operation.

Vacuum Oil Co.—This display was all Mobiloil, a special lubricant made especially for automobiles.

Valentine & Co.—The display here of varnishes and colors especially adapted to automobile work was most complete. No less than ninety-six superfine enamels suitable for this class of work are listed in the company's handsome catalogue.

Voorhees Rubber Mfg. Co.—This is the first appearance of this concern at a New York show. Its specialty is the Non-Puncturable Cushion automobile tire, a feature of which is the patented cross-stay which prevents the retaining wires from cutting

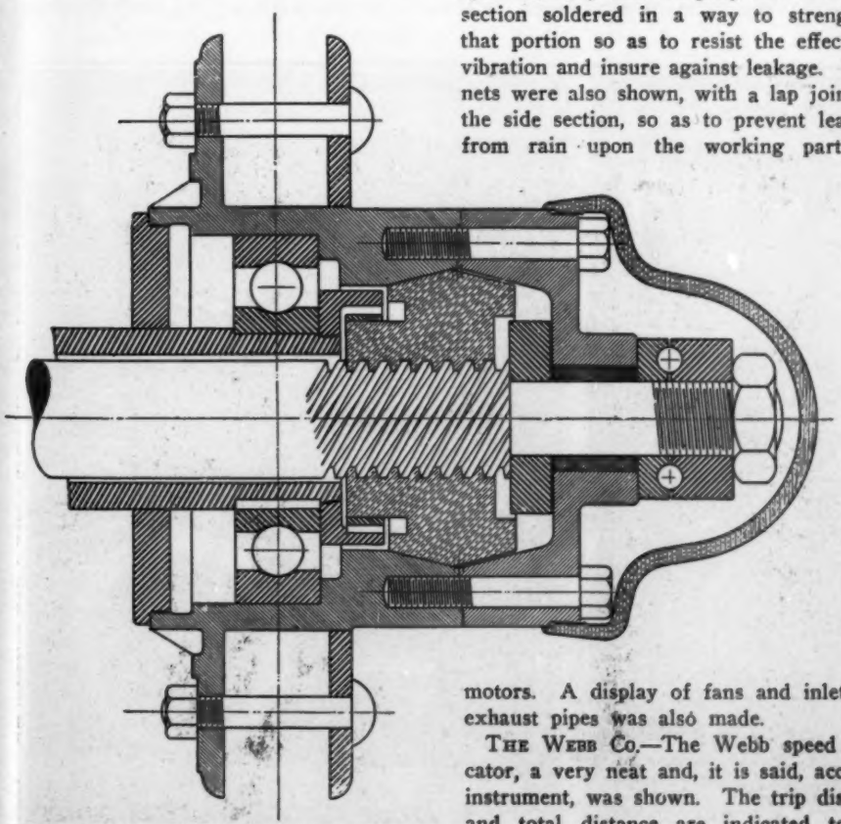
through the rubber. Some of the claims made for the Voorhees tire are ease of adjustment, lasting qualities, resiliency and anti-skidding qualities.

WHEELER & SCHEBLER.—The 1906 Schebler carbureter showed no marked changes, a modification in the float check being the only one noted. Carbureters in various stages of completion were shown.

WITHERBEE IGNITER CO.—The Witherbee storage battery igniter was shown in thirteen sizes. A non-leaking jar and carrying case was shown on the new goods. The company makes storage batteries for all purposes.

WRAY PUMP AND REGISTER CO.—Pumps in profusion, all styles, shapes and sizes were shown arranged in groups and singly. The line included the Kellogg compound double acting and Kellogg multiple gear compound pumps with register; National pressure register, Wray collapsible compound, Triplex compound, and Kellogg single action pumps, Wralog pneumatic jack, Kellogg multiple gear jack and the Ezy coupling.

WEED CHAIN TIRE GRIP CO.—This concern had ample opportunity during the early part of the week to demonstrate the effectiveness of its chain tire grips on the greasy asphalt. "Just the kind of weather we want," said the attendant at the stand. The wet weather resulted in good business—for the Weed people. At the stand where the chains were shown was also demonstrated a working specimen of Lashar's electrical speed indicator.



SECTION OF END OF HEDGLAND SOLID REAR AXLE SHOWING SCREW CLUTCH ACTING ON HUB OF WHEEL.

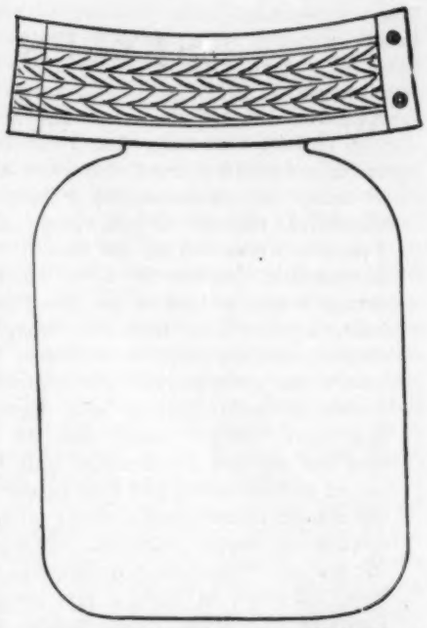
WAY MUFFLER CO.—The latest style of throat and chest protector shown by this company is made long enough to reach to the waist of the user—an important feature. With the addition of ear tabs and chin covering, the woolen garment is supplied with about every feature to add to the comfort of the automobilist while engaging in winter driving. The line of Way mufflers is a very extensive one, but it was shown very effectively in every distinctive shape and weight, and every conceivable color.

WARNER GEAR CO.—A complete exposition of the equalizing gear of this company attracted much attention. The complete line of Warner sprocket and bevel drives was also shown.

E. J. WILLIS CO.—This supply house had, as usual, a large exhibit, comprising almost everything in the automobile line except a complete automobile. A new specialty is the "Autolog," a speed indicator with a round dial. This has a double-pointed hand, one end of which indicates speed in miles per hour and the other in kilometers; a total and a trip odometer are included, the latter having a separate pointer with dial reading to hundredths of a mile.

WHITLOCK COIL PIPE CO.—At this stand was shown the full 1906 line of Whitlock coolers in the various sizes and shapes as supplied to the leading American car makers. The Whitlock hoods of steel and aluminum in different sizes and shapes were also shown. All the radiators for 1906 made by this company have the first section soldered in a way to strengthen that portion so as to resist the effects of vibration and insure against leakage. Bonnets were also shown, with a lap joint on the side section, so as to prevent leakage from rain upon the working parts of motors. A display of fans and inlet and exhaust pipes was also made.

THE WEBB CO.—The Webb speed indicator, a very neat and, it is said, accurate instrument, was shown. The trip distance and total distance are indicated to the tenth of a mile, while the speed rate is shown by an index which is lifted by an air current passing round it in a taper glass tube. A tiny pump creates an air current whose volume of velocity varies in exact proportion to the speed of the vehicle. While recording the smallest variations, this delicately adjusted instrument is very strong in addition to being weather tight.



WAY MUFFLER FOR AUTOMOBILISTS.

WARNER INSTRUMENT CO.—At this company's stand were shown two Warner Auto-Meters, in operation continuously from the opening of the show. They were run by the same electric motor, and had not varied a fraction of a mile in five days in the total mileage registered. Both recorded an average speed of thirty miles an hour during that time. Spectators were much interested in the evident accuracy of the device. A new universal fitting bevel gear drive for the use of this meter on close coupled cars was shown, and American pliable tube is now being used instead of the German article as heretofore.

WHITNEY MANUFACTURING CO.—Four new Whitney chains of the commonly used sizes were exhibited among the rest. These are wider than those made last year and have shorter pitches. It is asserted that quieter running is obtained from the shorter pitch. The Whitney company furnishes manufacturers with blue-prints of sprockets especially designed to fit the Whitney chains.

ORLANDO W. YOUNG.—Oils, soaps and polishes were displayed. The new metal polish, a compound just received from the laboratory, was shown. The ingredients remain in solution readily.

The Automobile Club of Milan, Italy, has started an automobile ambulance service between the city hospital and the neighboring villages. The club has opened a subscription and its members have already contributed a large sum to enable the service to be conducted.—*Exchange.*

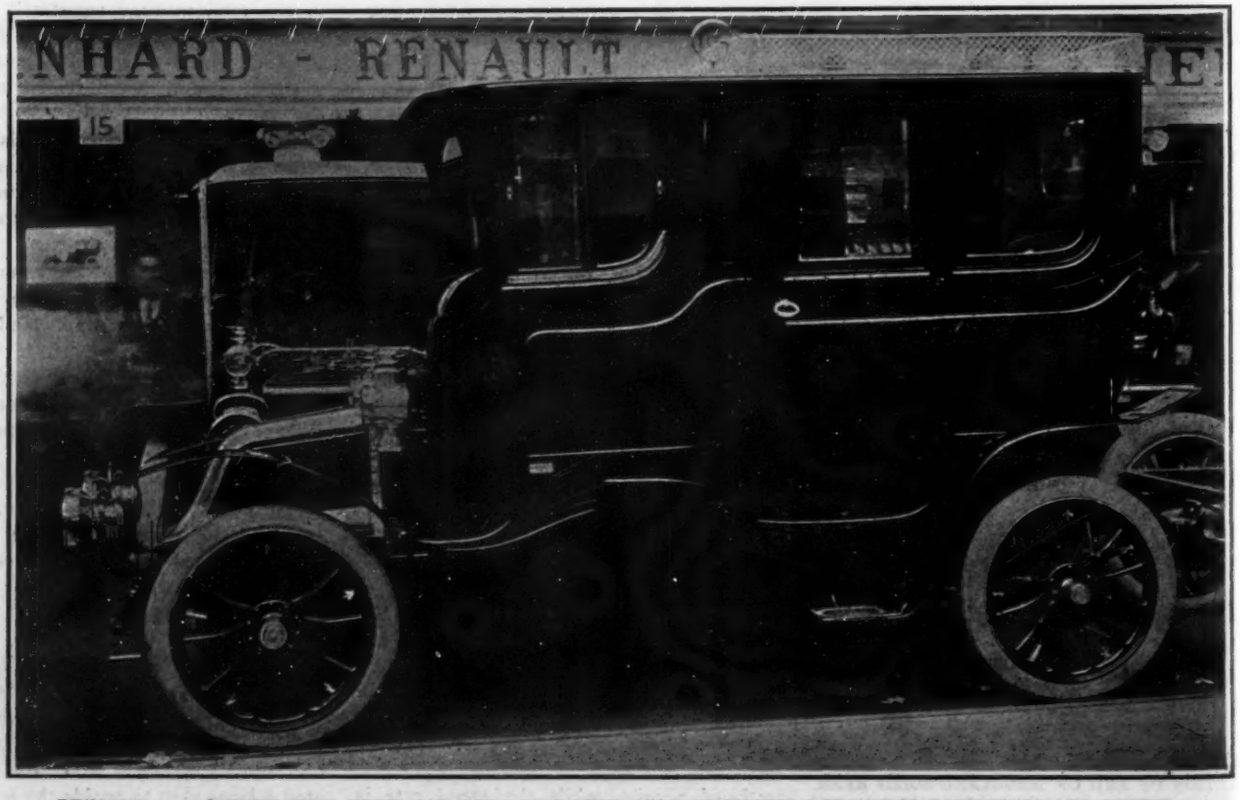
STYLES IN CAR BODIES AND FITMENTS.

WHILE the display of bodies at the Garden and the Armory is interesting and also indicative of a wider range of utility for the automobile, it lacks the distinctive features of the 1905 shows. These, as chronicled at the time in THE AUTOMOBILE, marked a very important change from the open to the closed or, at least, covered car, and also from the cramped and awkward rear-entrance tonneau to the more graceful and comfortable surrey or double-phaeton with doors on both sides. At the present time the covered car and the side-entrance body have ceased to be novelties and have passed into the domain of everyday accepted facts, attracting no special attention. There are but few novelties in body design, and very little difference in type, a few standard forms being accepted by all makers, and, apparently, by the great majority of owners. This is well shown by the uniformity with which the same few elements were displayed on stand after stand throughout both halls; the bare chassis, the chassis with "touring" body, and the chassis with permanently enclosed body. It may be noted in this connection that many of the leading makers have this year limited themselves to a single chassis, of some one given horsepower, to which they will fit any type of body to suit the customer. The actual separation of chassis and body is quite as complete as in France, and the old black box with wheels on each corner and more wheels inside is no longer to be found.

Omitting the runabouts and other very small cars, the standard American body is the "touring," with front and rear seats and entrance on both sides, the total length being materially greater than the old tonneau, with a proportionate gain in space for legs and feet and for stowage. As applied to what has been known here as the surrey and in France as the "double" phaeton, the term "touring" is misleading, as a plain, open body is better fitted for short runs by day than for touring in all weathers. If the term "touring" is fairly applicable to any one type alone, the enclosed limousine would seem to be the real touring car, as it, most of all, offers in its integral form and without the aid of attachments those comforts and conveniences which are essential in other than short runs in clear weather. However, the terms in current use are "touring body," as applied to open double-seat cars of the surrey or victoria type; limousine for the permanently enclosed body, and landaulet for the town body with folding top and sides.

The necessity for a cover, if not for complete enclosure, is now generally recognized, and all the open cars may be fitted with some form of victoria or extension top of the Cape top, folding back when not in use, the complete enclosure for very bad weather being obtained by means of side and rear curtains. In the completely enclosed limousines the windows are larger and more numerous than last year, with all sashes fitted to open. Many of them drop into pockets in sides, back or doors; in some cases two hinged sash side by side are used, one opening on the hinges, while, if desired, the two together may be lifted out. The idea is to obtain as much light and as good ventilation as possible in the closed body for cold and stormy weather, and in dry, warm weather to remove the sashes entirely, leaving the car open on sides, front and rear. In the landaulets the sashes generally drop, giving plenty of air without folding back the top.

The two shows together disclose a very large collection of good bodies, of both French and American make, but in a comparatively small number of types and with little difference in points of detail. There are fewer freaks than ever before—in fact, none worthy of mention, and there is evident a general improvement in body design in both room and appearance. Where many of the smaller touring bodies of last year were practically if not actually made-over tonneaus, with the cramped foot-room and other disadvantages of the old type, this year there are many well-planned and roomy bodies on the moderate-priced cars.



RENAULT 10-14 HORSEPOWER TOWN CAR WITH LIMOUSINE BODY COMPLETELY INCLOSING PASSENGERS AND DRIVER.

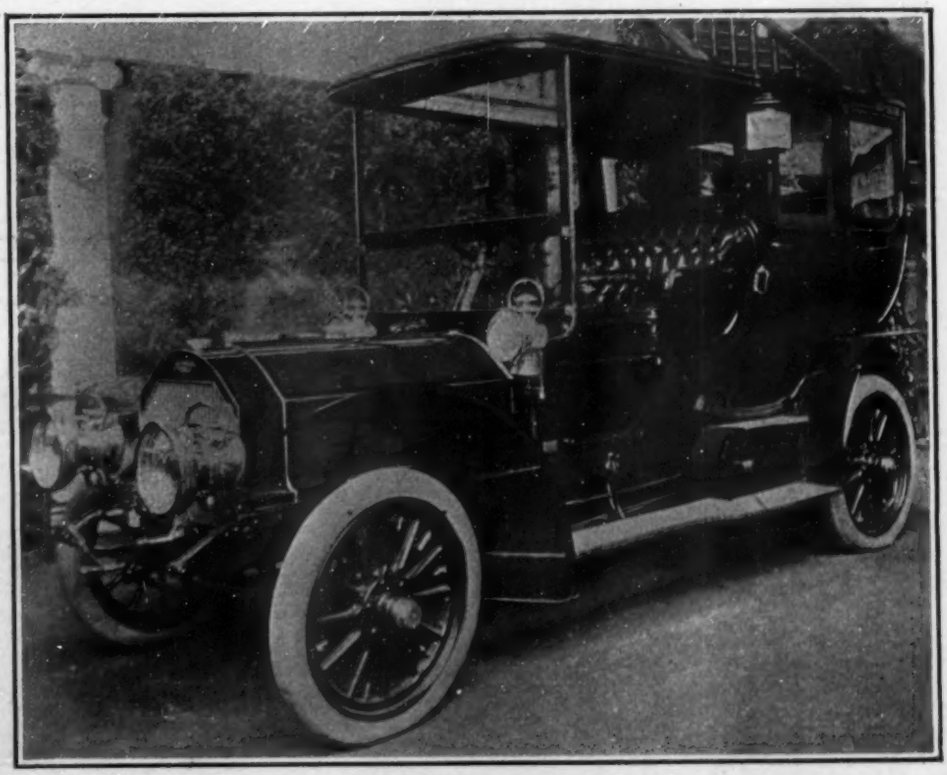
DECAUVILLE TOURING CAR WITH AUDINEAU CONVERTIBLE LIMOUSINE OR OPEN BODY.

The general characteristic of the body design is a greater simplicity and the prevalence of straight-line forms; the Hogarthian and Spencerian lines of beauty are less conspicuous than of old. The exception to this rule is the popularity of the victoria type, with its long, flowing curves, as found in many touring cars. The *Roi des Belges* body is less numerous in point of numbers and less extravagant in form than in former years. The most popular form to-day is the "convex" or "embouti," showing a single convex curve in place of the double reverse of the *Roi des Belges;* apart from the fact that this form gives rather more room on the seat, it is specially adapted to the limousine, as the curve of the lower back sweeps fairly into the upper part of the back.

The small and low-priced runabouts are less conspicuous than ever before, not that they are in any way less numerous or less popular, but the same firms which made a specialty of them a year or two ago are now displaying far more pretentious cars—touring, limousine and landaulet. While the runabout trade is by no means neglected, the limited space at the shows is given to the new and higher-priced productions. A very odd development of the runabout idea, not entirely unknown, but reaching new and greater proportions this year, is the runabout body on an expensive and powerful touring chassis. At first sight this seems somewhat of an anomaly; but there are reasons for it. The automobile is coming into more general use as a practical everyday vehicle for travel between home and office over distances of from ten to forty miles, with good road conditions, as speedy and far more convenient than the railway with a trolley ride at one end of the route and a carriage ride of a mile or so at the other. For this purpose a man does not care to encumber his car with a heavy tonneau which will be empty most of the time, and the plain runabout body with two individual seats side by side in front is preferred.

Another reason may be found among those who have for several years kept open house, so to speak, for their friends, in a large touring car. Such guests as a class are not over-punctual, and the whole schedule of the day's pleasure is often marred at the start by their fondness for still another short nap. The entertainment of a party of four or five involves no small expense in addition to the legitimate costs of running, and in not a few cases such deadhead passengers are lacking in appreciation of the favors conferred. The over-confiding motorist who has for a couple of seasons played the rôle of "Mr. Easy-mark" in his big tonneau is the first to welcome the new innovation, the runabout body for his large and powerful chassis. It gives him an excuse for limiting the size of his party to one congenial companion, and if need be he can have a rumble seat in the rear for servant or chauffeur. Such bodies are shown on chassis of from 18 to 50 horsepower by the Winton, White, Packard, Peerless and other makers.

In the line of large bodies for six or more persons the most conspicuous is the "Overland," built by Quinby, and shown on a Smith & Mabley Simplex chassis. The body is of the convex pattern, with demi-limousine top, sides and back of rear seat enclosed, and top extending for the full distance to front glass. The rear seat, very wide and comfortable for three persons, is supplemented by two fixed individual seats with high upholstered backs, the way to the rear seat being between the other two. The side door is forward of the two seats, and in front are two more individual seats for driver and one passenger. The lower part of the body is finished in black, the sides and back in crimson with black mouldings, and the upholstery is in red leather. The rear sash drops and the single side

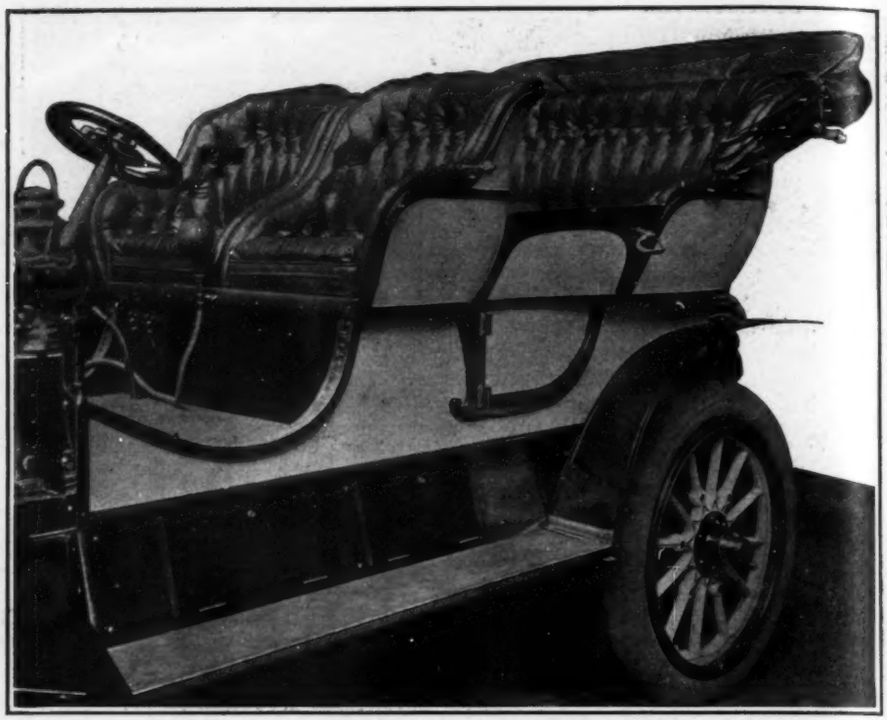


APPERSON BROTHERS' LIMOUSINE CAR WITH KIMBALL BODY. NOTE CARRIAGE SIDE LAMPS.

sashes are removable. Another fine large car seating five in the tonneau was a Fiat, finished in bright red, there being two individual seats disposed in front of the rear seat.

The most perfect combination for all-the-year-round work is found in the two separate bodies, touring and limousine, interchangeable on the same chassis; and, as already stated, the latest limousine may be thrown open on sides and back by means of ample windows. Still another idea is shown in one of the Decauville cars and also in a large Aster limousine. The Decauville body was by Audineau, of Paris, finished in brown, with black moulding and gold stripes. The top was divided from the body proper on the line of the seat tops, being held in place by bolts and notches. Four eyebolts were fitted on the roof, into which slings might be hooked for hoisting, the entire top and sides above the seats coming away. This car was also fitted with two electric side lamps, attached near the roof, and just in front of the door, for temporary use in running at dusk, when it is not desirable to stop to light the main lamps.

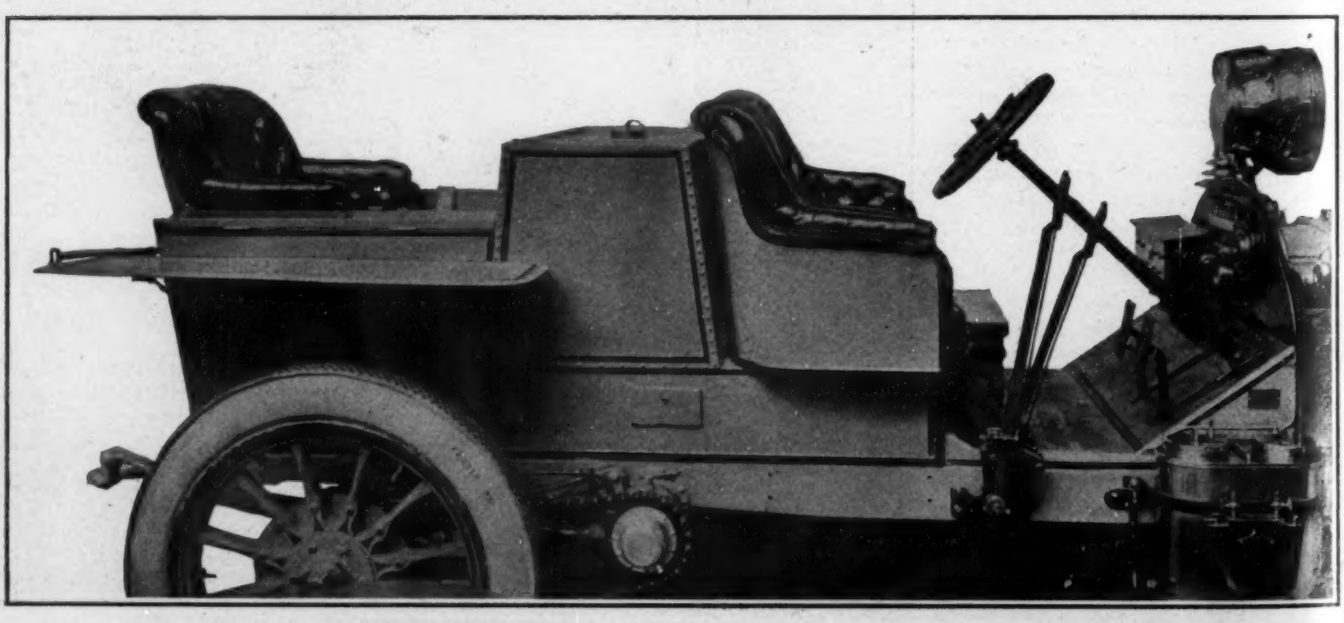
The Aster car, of 30-35 horsepower, also by Audineau, was finished in deep red, with black mouldings, the intreior in red leather. The break between body and top was along the upper line of the seats, eyebolts being provided for the lifting, the two parts being fastened together by four bolts. The side windows were in two parts, hinged so that one would open, being held by a catch, or the two together could be removed entirely. The usual baggage rail was fitted with two individual front seats and glass front to body with sliding sash in front of driver. Two extra seats within the roomy body were of the theater pattern, with fixed backs and seats folded up; each was mounted on a vertical spindle near the doorpost, being swung back out of the way when not in use.



AUSTIN TOURING CAR FINISHED IN WHITE AND BROWN WITH VICTORIA TOP. NOTE SIDE LOCKERS ABOVE RUNNING BOARD.

It is a difficult matter to select from the very large number of bodies on exhibition, but the following examples will give an idea of the tendencies of the day. A Berliet chassis exhibited by the American Locomotive Automobile Company had a body by Kellner, a landaulet in black with bottle-green vertical stripes, the interior finished in whipcord. The body was attached to the chassis by four bolts, being easily removable when it is desired to change to another form. The interior was very fully furnished, with electric light, annunciator, speaking tube and small folding writing table hinged downward from the rear of the front seat. The two extra seats, mahogany frame with cane filling, were on spring hinges attached to the rear of the front seats, with sliding metal legs; they could be dropped quickly, and when released swung up against the front seats out of the way. An oblong card table about one foot wide and three feet long, of mahogany, with green baize center, pockets for counters being hollowed out around the rim, could be hung by four straps from hooks in the sides.

Several cars shown last year exceeded in



CLEMENT-BAYARD FAST TOURING CAR WITH FIFTY-GALLON GASOLINE TANK LOCATED BEHIND THE FRONT SEATS.

number and variety of touring fittings those at the present shows; the most complete of the latter being a body by Mühlbacher, on a 50-horsepower Charron, Girardot & Voigt chassis. This was a very handsome landaulet, finished in dark blue, with vertical stripes of a light blue; the interior in *cafe-au-lait* leather. The wide rear seat was supplemented by two fixed seats with permanent backs, and in addition there were two folding seats hinged to the rear of the front seats. Between these last was an icebox, finished in birdseye maple, and beneath them were two drawers, with birdseye maple fronts, sliding under the front seats, for provisions. Two electric lamps were fitted, with speaking tube and whistle and electric ten word course telegraph, the buttons near the rear seat and the annunciator, with ten words showing in red letters by electric light, just in front of the driver. A small electric lamp on the steering post threw light on the driver's clock, oiler, etc. A novel feature, derived from carriage practice, was a shield attached by brackets to the lower part of each door and covering that portion of the running board in front of the doorway to keep the mud from the step. In this same exhibit was a handsome C.G.V. car of 25-horsepower with engine beneath the front seat, a landaulet in green and black.

The American Daimler Company showed a handsome Brewster limousine, with graceful paneling, finished in carmine with black mouldings, the interior in *cafe-au-lait* cloth. There were two folding seats inside, and the drop sash, two in each side and in each door and the rear, made the body fairly open. A handsome touring body of similar finish was also shown.

The Mors exhibit had two handsome bodies by Demarest, of New York, limousine and landaulet. The same makers were also represented in the Panhard exhibit by a limousine on a long chassis of 24-32 horsepower; the body with maroon panels, black mouldings and fine red stripe; the wheels and chassis in automobile red. The interior was finished in whipcord and contained two permanent individual swivel seats. The ceiling was of polished mahogany of fine grain and color, very rich in appearance. The windows were large and of graceful outlines, two in each side, one in the rear and one in each door, all fitted to drop. The space beneath the rear seat was used for storage from the rear; the tool box was under the rear of the body; baggage rail and trunk rack were fitted.

Another Panhard chassis carried a limousine body by Labourdette, of Paris, in dark green with black mouldings and light green stripes; the interior finished in dark green leather, with cloth ceiling to match. The two extra seats folded up against the front. In this same exhibit was a touring body by Mühlbacher, the lower part of the body in black and the door and upper part in dark red with a triple vertical stripe of a brown shade. The back was high, with a wide rear seat, and the doors were specially wide. Two permanent seats with backs were fitted and also a victoria top.

The Rainier Company showed a 30-35 chassis with a large limousine body by Burr, of New York, in Brewster green with black mouldings and fine red stripe; the doors, side and rear panels in imitation canework in white. The rear window was fitted to drop and the double side windows to open or to be removed entirely. The interior was fitted with drop seats, annunciator, lamps and pockets. At the same stand was a runabout in red, with two individual seats, on the 30-35 chassis.

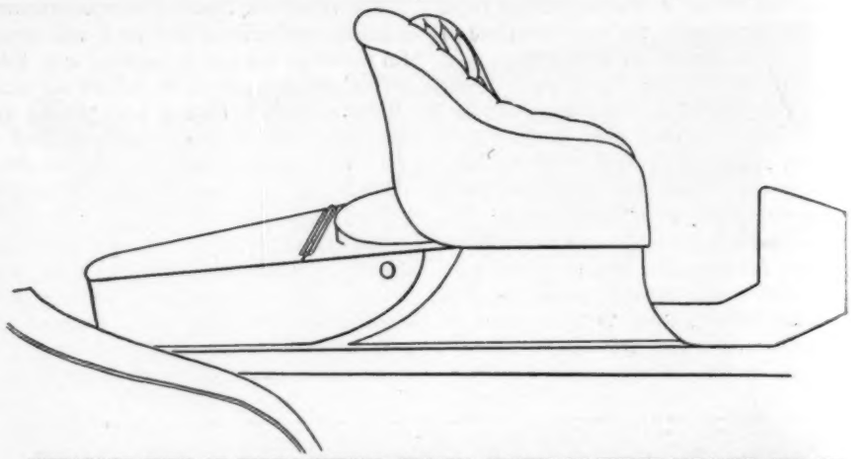
The Austin Automobile Company showed three different bodies—jump-seat runabout, touring car and limousine—each on the 60-horsepower chassis. The runabout had two individual front seats, the space beneath being used for storage, and a folding rear seat with adjustable bronze arms, accommodating two persons. The finish was in olive brown with black mouldings and gold

C. G. V. 25-HORSEPOWER INCLOSED CAR FINISHED IN GREEN AND BLACK WITH MOTOR UNDERNEATH DRIVER'S SEAT.

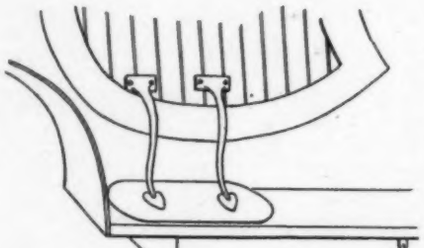
stripe. The touring car was finished in white with olive brown mouldings, and carried a victoria top. The limousine was finished in olive brown, black and gold. One peculiarity of all these cars was the use of the space immedately under the body and over the running board for stowage. This space was filled in with mahogany, with two drawers on each side for tools, batteries and the side curtains.

The Smith & Mabley exhibit contained many handsome specimens of body making, both American and foreign, but the most conspicuous example was the all-metal body made by Quinby, on their new system. The body was a limousine, with convex back and corners curved, showing very graceful lines. All panels were of aluminum, joined by mouldings of brass secured from within and brazed at all joints. This concern has abandoned wood in favor of aluminum for automobile bodies, the latest ideas in metal construction being here shown. There is no possibility of water leaking back of the mouldings, and there are no exterior nail-holes to be puttied over. The exterior of the body, just ready for the paint, was shown in burnished aluminum and brass; the interior was finished in light green leather. The rear and side sash were fitted to drop, and the curved sash in the rear corners were removable. A similar Quinby body was also shown in the Haynes exhibit, and another, a demi-limousine, was poorly placed in the basement of the Armory.

A novelty in closed cars was installed in the Smith & Mabley space on Friday, attracting much attention. The chassis was a Renault, with only 10-14-horsepower motor; the body, by Audineau, was a completely enclosed limousine, finished in dark green and black, with interior upholstered in whipcord. The front was extended to enclose the steering wheel and levers, the upper half being of glass. There was the usual rear seat of the limousine and a wide front seat for two, the driver's half fixed and the left half swiveled. The entrance to all four seats was by the side doors, the driver and companion stepping to the front by the swiveled seat. Once inside, four persons could be comfortably seated and completely protected from the cold. The windows were large, the side sash being hinged. Smith & Mabley also exhibited a "hansom" body, by Quimby, in black with red leather upholstery, with double front seat.



RUNABOUT BODY ON HIGH-POWERED CHASSIS, SHOWN ON WHITE STEAMER AND ON VARIOUS GASOLINE CARS.



C. G. V. MUD GUARD TO PROTECT DOOR-STEP OF CLOSED CAR.

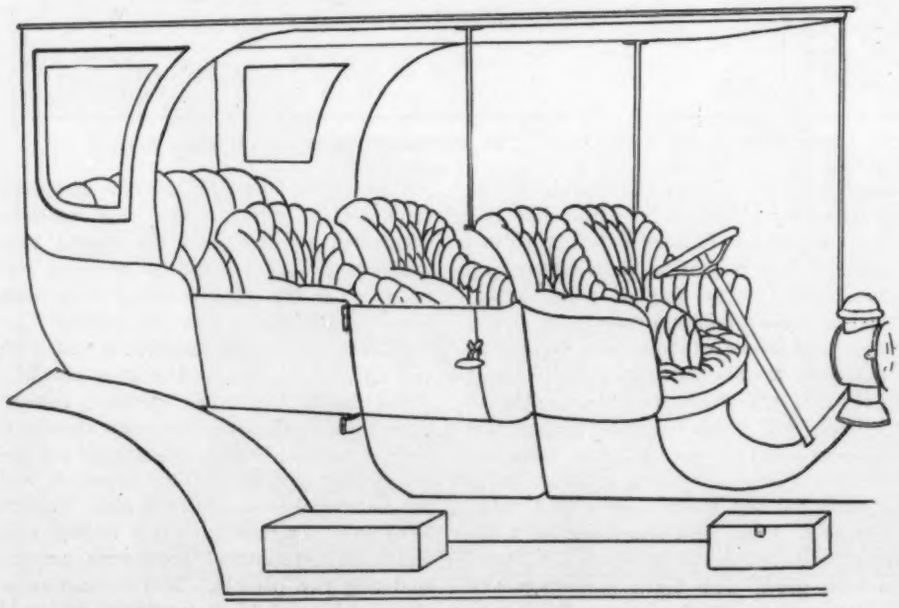
Another attractive "hansom" was shown on a 12-16 Decauville chassis, body by Audineau, finished in blue with light blue stripe, and fitted with inside drive, electric light, etc.

The Locomobile exhibit included a limousine with swelled sides, giving very roomy seats, the body in maroon and the interior in red leather. The two extra seats were arranged to slide forward under the front seats and when closed were covered by a padded leather flap. When drawn out this flap formed the upholstered backs for the seats. A touring body in this exhibit was finished plainly in gray and black, the upholstery being of dark green leather, plain without tufting, making a very rich and elegant finish.

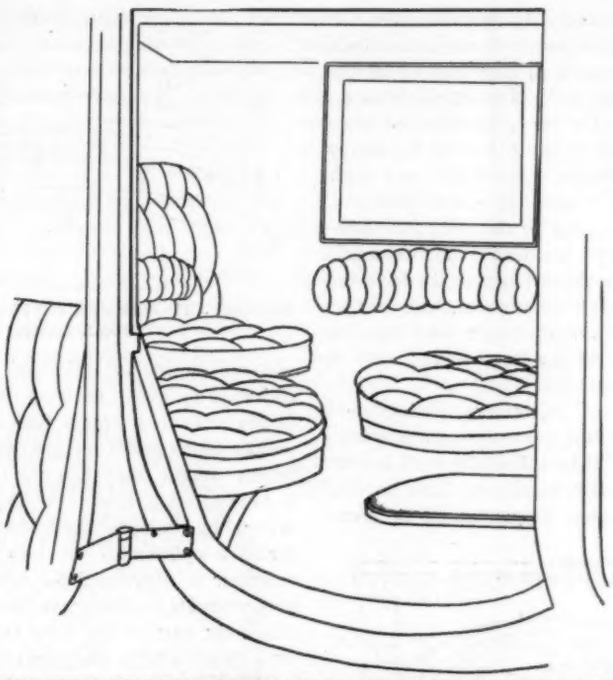
One of the notable limousines was by Kellner, on a Leon Bollee chassis of 45-50 horsepower with 120-inch wheelbase. The style is known as the St. Christopher limousine, with convex body and the rear corners beveled, finished in wine color with black and red vertical stripes. The doors were very wide and the rear seat was fitted to pull forward, making a wide, deep seat for reclining. For access to the top in stowing luggage, a special step was attached to the driver's seat, with a brass handle attached to the roof. On the top of the car was one of the new tire trunks, a circular telescope bag of waterproof canvas on a light wire frame. Three straps of white kid served to close it, and a padlock made all secure for shipment. The case was large enough for several tires.

A variety of the runabout was shown by the St. Louis Motor Car Co. on a 30-horsepower chassis, a victoria seat for two, with victoria top at 1 a long, plain box body in the rear, the car being intended for a doctor or as a fast runabout. The large panel of the side was in yellow, with mouldings in two darker shades.

Last year the extra seats were of a more or less extemporized and flimsy character; while perfection has not yet been reached in this detail, the general construction has



"OVERLAND" SEMI-INCLOSED BODY ON SMITH & MABLEY CHASSIS SEATING SEVEN.



LIMOUSINE BODY WITH SEPARATE FIXED SEATS AND BACKS AND EXTRA SEAT DRAWING OUT UNDER FRONT SEAT.

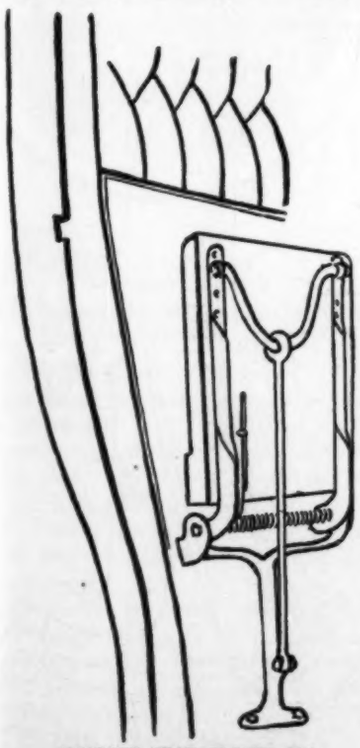
improved. As already noted, a number of individual seats of the bucket type, with full back, are fitted in the larger bodies as permanent fixtures supplementary to the rear seat. In a number of cases the extra seats slide in under the front seats; in the Bollee limousine already described the upholstered leather flaps which cover the seat when closed forms both back and cushion when the seat is drawn out for use. In one Rothschild body a small seat for a child pulls out from the center of the rear seat. In another body by Boulogne a child's seat folds up when not in use into the rear of the front seat. In some cars the extra seats are of the jump-seat variety, folding forward and down, and the legs lying flat on the floor.

Last year, in addition to the touring body, samples of closed bodies were shown by many American makers; this year every standard American make has at least one good closed body in its exhibit, and sometimes several of different types or finish. Some of these bodies are built in the home shops, but a very large number are the work of body specialists—former carriage builders in different sections of the country. As many of the completed cars sell for a price that would not buy an imported chassis, it is not to be expected that the work on the bodies is equal to the highest, but to all appearance it is good of its class. One need no longer buy a foreign car in order to obtain a closed body, as these can be had of American make in the moderate priced as well as the more expensive cars.

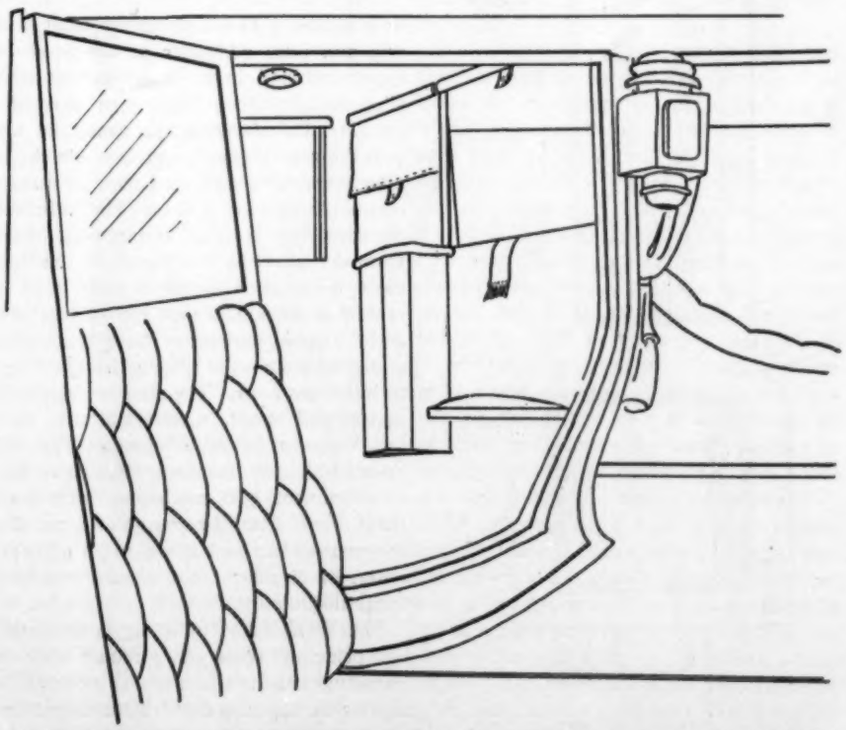
In the matter of color there is a pleasing absence of the loud and garish, and a variety of good standard carriage colors in the usual combinations of maroon, carmine, dark greens and blue with black; the distinguishing firm colors of bright yellows, blues, greens and red, a survival of old bicycle days, were much less in evidence than ever before, the general finish being after good conventional carriage lines.

From such evidence as the Garden and the Armory offer, it would seem that the development of the perfect automobile body is only a matter of time and of good taste and judgment on the part of the users. Much has been learned from France in the direction of new styles and special adaptability to automobile as distinguished from carriage uses, as well as in structural details; and on the other hand all the skill and taste of the American carriage builder have been diverted into the new field.

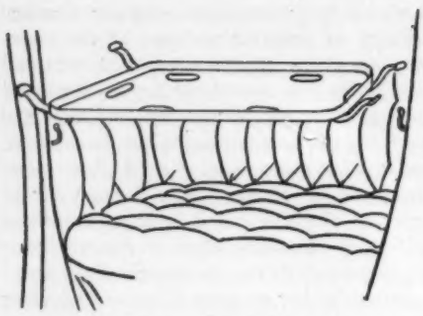
The leather side curtain to the side openings in front of the driver's seat have been in vogue for several years, but this year they are replaced in a number of instances by low-hinged doors, completely enclosing on the sides the foot room of the front seats and adding greatly to the comfort of the driver and his companion in cold weather.



FOLDING SEAT CLOSED BY SPIRAL SPRING.



INTERIOR OF ST. CHRISTOPHER LIMOUSINE SHOWING EXTRA SEAT TO DRAW OUT, AND CABINET.



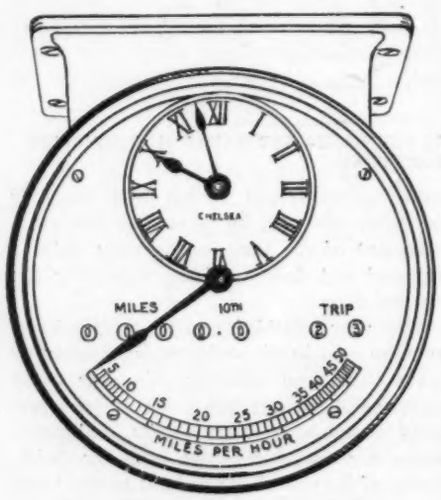
BERLIET DETACHABLE CARD TABLE.

There was noticeable last year a new attention to detail in the fitting up of cars of various classes, in particular the closed touring bodies, every available space within or beneath the body being utilized for some special stowage of tools, tires, ice, luncheon, clothing and the like, and many minor conveniences in the line of pockets in upholstering and on doors, hidden mirrors and cases for toilet articles, cases for writing materials, and similar devices being added. The cars of this year are similarly equipped, but there are no special novelties over last year.

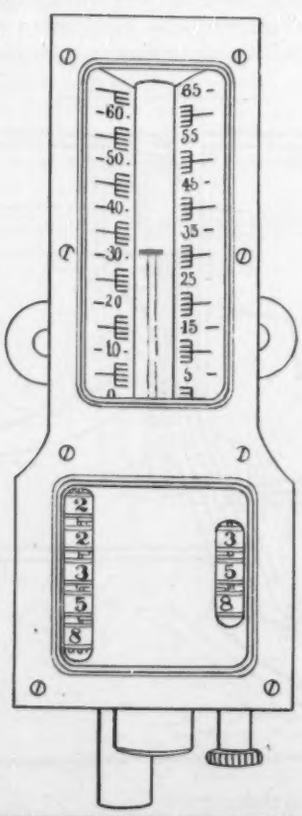
In the way of entrance the running-board for the full distance between front and rear fenders is even more common than last year, but few separate steps being seen on the touring cars. A typical exhibit in this line is the Q. & C. Stanwood steel step, made of thin strips of Bessemer steel, crimped and on edge, somewhat similar to the metal doormat. As a substitute for the wooden footboard with rubber tread this new device is light, strong and very durable, while it acts as a foot scraper and mat and avoids the common danger of slipping when the step is icy or wet. It is made both as an individual step and as a continuous footboard, and fitted to many cars as a part of the stock equipment. An extra step high up on the side is seen on a few limousine bodies, to give access to the roof for stowing the luggage. A novelty in automobile practice, though old in carriage work, is the mud guard already mentioned, attached to the lower edge of the door and keeping clean the step to the rear body; this is shown on but one car.

The exhibit of odometers, tachometers and other time- and space-measuring instruments is larger than usual, the well-known Jones and Veeder machines, both in improved form, being supplemented by some new makes. The Lea Speedistimeter is a trip and total odometer of the mechanical type combined in a single fixture with a Chelsea auto clock; the upper part of the circular dial showing the time, the lower part the rate of speed, and, between the two, odometers for season and trip, all measurements being in miles. The McGiehan Speedometer is also mechanical, driving from the wheel by flexible shaft, the instrument being rectangular in face, with trip record at the top, season record just below, and the speed register at the bottom, a hand and graduated scale giving the speed up to 60 miles per hour. The simpler forms show season and speed, season and trip, or the total season mileage alone. The Hick Speed Indicator Company shows two forms of instrument, both mechanical with flexible shaft drive. One of rectangular form shows the season, trip and speed to 50 miles; the other, of circular form, shows season and trip mileage only.

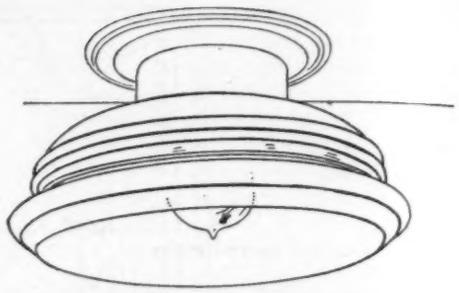
The Webb speed indicator is on a different principle from the circular scale and swinging hand; the scale is vertical, and similar in appearance to a thermometer or steam gauge, very legibly graduated with horizontal black lines for the units (miles) and red figures to right and left for every fifth mile up to 65. Between the two columns of graduation is a glass tube of taper form, within which floats the indicator, of but five grains weight and showing in the tube as a heavy black line. A small air pump driven by flexible shaft from the wheel forces a column of air into the tube, the indicator floating on this column at a height proportionate to the pressure of the air. In the lower part of the case are two odometers, showing total and trip mileage.



LEA SPEEDISTIMETER WITH CLOCK.

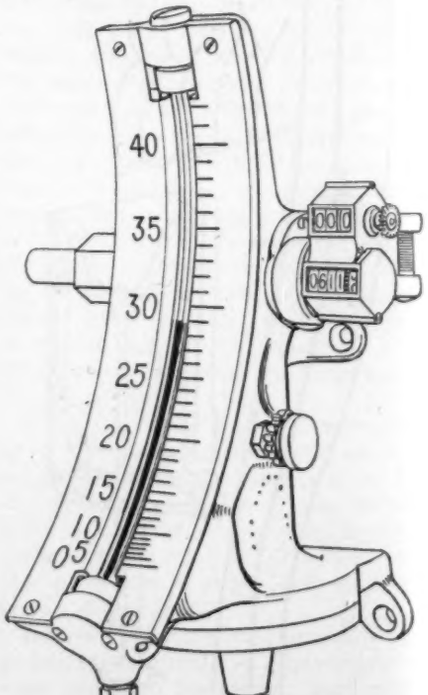


WEBB COMBINED SPEED, TRIP DISTANCE AND TOTAL DISTANCE INDICATOR.



ENGLISH AND MERSICK INTERIOR LIMOUSINE DOME LAMP.

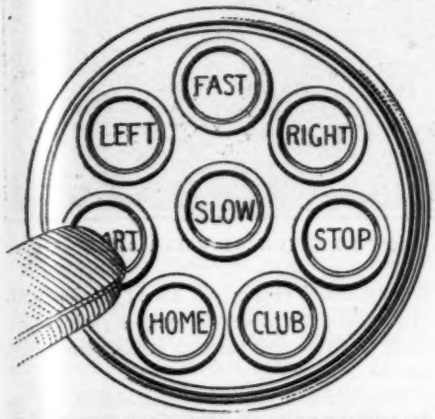
The Hopkins autolog is of the mechanical type with flexible shaft drive and circular index plate, but the hand is double and the dial has a double graduation, miles in the upper semicircle and kilometers in the lower. A glance at the upper end of the arm shows the speed in miles, while the lower end shows the speed in kilometers. Total and trip mileage are also shown in the center of the dial, the trip odometer being provided with a special timing hand, revolving once for each mile, by which the separate miles may be timed with a watch. The speedometer is graduated up to 60 miles and 100 kilometers. A separate form is also made, the speedometer alone, without the odometers.



VEEDER TACHODOMETER.

The Esco speedometer, made in France, is of the electric type, the main part of the instrument being a small magneto attached to the steering knuckle and driven by a rubber belt from a large grooved rim attached to the spokes of the front wheel. The indicator is a circular dial in a metal case, attached at any convenient point and wired to magneto, the hand showing the speed in kilometers on the curved scale.

The Monitor speed recorder is also an electrical device, more costly and complicated than the usual automobile indicator, being primarily intended for marine, stationary and pumping engines of large size.



JONES AUTO ANNUNCIATOR—DIAL INSIDE CAR.

JONES AUTO ANNUNCIATOR—DIAL IN FRONT OF DRIVER.

It gives the speed and the number of revolutions, recording on paper. It may be used on an automobile.

The auto clock is shown in various styles, with the plane and convex glass; the silvered face with each figure on a large black disk is the most legible by night. A special form of timing clock, with stop and flyback, is shown.

The devices for producing noise of a more or less musical character in quantity are more numerous than ever before; to the improved varieties of the plain auto horn being added the chimes and the siren. The plain bulb horn with flexible tubing is now supplemented by several makes of electric horn. In addition to a small battery and the wiring, the apparatus consists of a small attachment containing a diaphragm and electric sounder, to which the horn may be screwed after the reed and piping have been disconnected. Push buttons in any desired number may be placed about the car, thus putting the horn within reach of any of the passengers.

The sirens are shown of various makes, but all effecting the same end of unintermittent, unlimited, unmusical mechanical noise. The Gabriel horn is shown in an enlarged form with eight elements controlled by keys, on which an air may be played after the fashion of chimes.

The King auto lorgnette—a leather frame about six by eight inches with handle like a fan, the upper half being filled with smoked celluloid and the lower with the clear—is used to shield the face from the wind and the eyes from dirt and glare; it may be used as a fan, and a small metal hook on the upper edge serves to hold the hat on. A wrist strap is provided to guard against loss. Another odd motoring novelty is a folding hairbrush, with detachable mirror, the whole about the size and shape of a pack of cards. It may be noted that no genius has yet devised a practicable dust brush, to be driven by electricity, or an exhaust dust extractor for the clothing using compressed air.

Leather and canvas mailbags and similar articles are shown by Boyle, also a variety of automobile trunks and hampers, including special lines for certain makes of cars; with these are the leather license pad and the leather tool kit.

Air-Cooled Cars at the New York Shows.

LAST year the Garden Show introduced to the public a considerable number of novelties in air-cooled construction, notably the Frayer-Miller, Marion, Marmon and Corbin cars and the four-cylinder Waltham-Orients, all of which were then seen in New York for the first time. This year, on the contrary, at the New York shows there are no striking novelties whatever in this line, and practically all of the changes from last year consist in improvements of detail or enlargement of cylinder sizes. The only marked departure from lines established a year ago is seen in the new four-cylinder Knox, which has already been described in these columns. The cylinders of this car are of 4 3-4-inch bore by 5 1-2-inch stroke, and have the characteristic Knox porcupine construction. Owing to the length of the pins on the cylinders, the latter are spaced a considerable distance apart, making engine long in a fore-and-aft direction, a fact of which advantage is taken to provide unusual wearing surface on the crankshaft, which has five bearings. The cylinders are cooled by a five-bladed fan about 17 inches in diameter, and the toe-board is made sloping, to give the air as free an escape as possible. The cylinder heads alone depart from previous form, being cast with vertical ribs and no pins. The valves open directly into the cylinder heads and are operated through rocker arms, there being two camshafts. The valve cages are removed by unscrewing threaded bushings which hold them down. The effective diameter of the valve opening is 2 1-4 inches, and the compression is stated by Mr. Jones, the designer, to be 55 to 60 pounds per square inch. The engine is geared to run 1,000 r. p. m. at about 45 miles per hour. Lubrication is by splash, oil being taken by a pump from the bottom of the crankcase and delivered by a branched pipe to the main bearings. In the second and fourth of these bearings the oil enters the crankshaft through drilled passages to the crankpins.

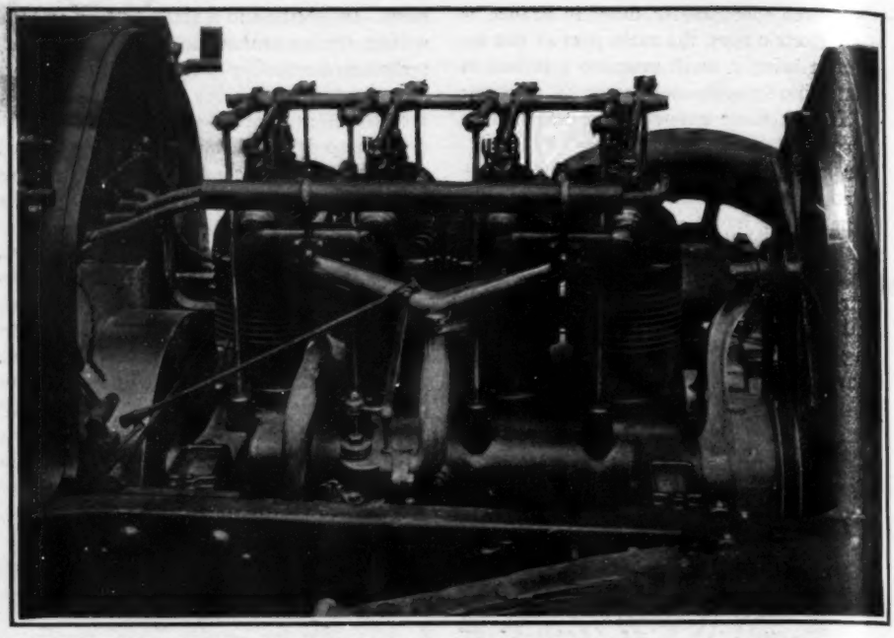
The car most nearly resembling the Knox is the Corbin, which, in fact, is partly the work of the same designer. Last year there were two sizes of Corbin cars, one rated at 16-20 horsepower and one at 30-35 horsepower. In both the Corbin cars the cylinders are cooled by an air current passing over a series of combs, as they may be called, stamped out of the sheet steel and forced into grooves in the cylinders with their teeth projecting. In the larger engine last year these grooves were vertical, but this larger model has been discontinued, and the 1906 16-20-horsepower car has circular grooves, as last year. This, of course, gives greater strength to the cylinder walls to resist the diametrical stresses due to the explosions, which are greater than the longitudinal.

The cylinder heads are separate from the cylinders and have ground joints. The elbows which form the intake and outlet for the gases are integral with the cylinder heads, and the valves seat in cages dropped into these elbows and held, as in the Knox. The compression is understood to be about 40 pounds cold-gauge test. The crankshaft is quite long and has long bearings and the crankpins are oiled, as in the Knox. An unusual feature of the engine is the use of Hess-Bright ball bearings for the ends of the crankshaft, though the three intermediate bearings are plain. The oil is fed by a pressure pump to a row of sight feeds on the dash, and thence by separate pipes to the cylinders and crankshaft bearings. The bore and stroke are each 4 1-4 inches.

The Marmon motor is not essentially changed from its form of a year ago, save that the cylinder sizes have been increased from 4 by 4 inches to 4 1-4 inches bore by 4-inch stroke for one size of motor and 4 5-8 inches bore by 4 1-2 inches stroke for the other. In the smaller motor the net valve diameter is 1 5-8 inch; in the other it is 1 7-8 inches. The cylinder heads are integral with the cylinders and the valves

seat in elbow castings which seat gas-tight in the cylinder heads. The heads themselves are cooled mainly by the same ribs that cool the walls, and no attempt is made to add ribs to the elbow castings. All the valves are operated by rocker arms from a single camshaft, and the V-shaped arrangement of the cylinders used last year is retained. The compression is about 30 pounds cold-gauge test, and the maximum engine speed under load is 1,900 r. p. m. The engine is cooled by a 17-inch, 8-bladed fan geared 2 1-2 to 1 from the engine. As before, lubrication is by force feed from the bottom of the crankcase, through a stuffing box at the front end of the crankshaft, and through passages drilled almost clear through the shaft, distributing oil to the main and crankpin bearings. The outlet holes of the crankpins are directed toward the axis of the shaft instead of radially outward, it being found that this gives a better distribution of oil, as the oil does not have to issue against the pressure on the working side of the crankpin bearings. It is, of course, at once carried around to the working face by capillary adhesion as the shaft revolves. An oil hole is drilled in the center of the pressure half of the crankpin bearing, but it serves a more logical function than the oil hole located at that point in many other engines, since a tube runs from it to the wristpin bearings, and the oil travels upward through this tube, being forced by the pressure on the bearing during the working stroke.

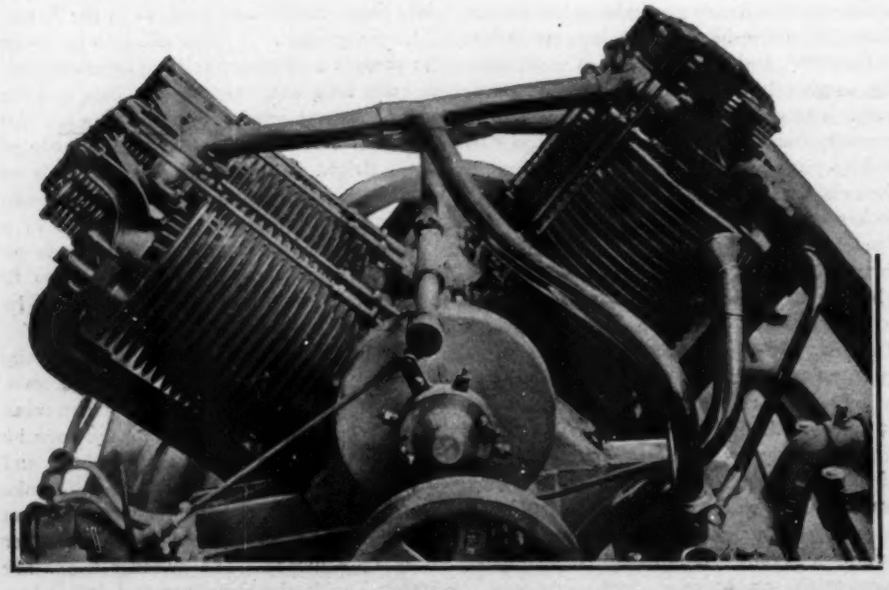
The Premier car of last year, with four-cylinder transverse engine having a bore of 3 3-4 inch and stroke of 4 1-4 inches, is continued this year practically without change. A new car has been added, however, with bore and stroke each 4 1-2 inches, and this motor is located fore-and-aft and cooled by an eight-bladed fan, aided by fan-blade spokes in the flywheel. There are two camshafts, and the push-rods on either side operate the valves on the other, through long rockers, thus avoiding the sidewise wear on the valve-stem bushings which is unavoidable with short rockers. The valves slant slightly and open directly into the cylinder heads. The inlet and outlet passages are elbow-shaped, as usual, and are cooled by fore-and-aft vertical ribs. Lubrication is by a four-feed Hill oiler, which mechanically distributes oil by separate pipes to the cylinders. The oilpan of the crankcase is partitioned into four compartments, each with its own level cock for trying the level of the oil. If the oil supply is not sufficient, additional oil is poured in through gauze strainers in the wings which support the motor, these being cast hollow and in communication with the crankcase. As the partitions below run only up to the normal oil level any oil added at one point will distribute itself properly. The cylinder walls are cooled by wide flanges, slightly shortened at front and back to reduce the length of the engine.



MOTOR END OF PREMIER AIR-COOLED CHASSIS SHOWING OVERHEAD VALVE ARRANGEMENT.

The Marion car is distinguished, as before, by the form of its cylinder flanges, which are not deep nor especially thin, but are machined to a smooth surface, this being claimed to facilitate the movement of the air currents. The engine has four separate cylinders and is cooled by a 17-inch 8-bladed aluminum fan. The toeboard is sloping, and the flywheel has fan-blade spokes. The cylinders are 4 1-2 inches bore and stroke and the inlet valves work in pockets at one side. The special feature of the engine is the large size of the exhaust valves, which open directly into the cylinder head and have an effective diameter of 2 inches. The exhaust pipe also is of large diameter, about 2 1-2 inches inside, and the header connecting the valve chambers with it has branches of easy radius, and increases in diameter from front to back. The compression is stated to be about 40 or 45 pounds cold-gauge pressure. The exhaust valves are opened by direct downward pull from the lower side of the camshaft, instead of by rocker arms as usual, thus reducing the noise. Over each exhaust valve is a sort of bulb-shaped expansion chamber, through which the valve stems are carried. Lubrication is by splash, and the pistons carry extra rings at the lower ends to prevent an excess of oil from going into the combustion chamber. An oil tank at the side of the crankcase admits oil through independent hand-operated needle valves to compartments at the bottom of the case, and glass sight gauges indicate the oil level in the compartments. The maximum speed of the engine is about 1,800 revolutions per minute.

The Aerocar, a newcomer from Detroit, follows conventional lines in all respects. The engine has four vertical cylinders cooled



INCLINED CYLINDERS OF MARMON 4-CYLINDER AIR-COOLED MOTOR IN THE CHASSIS.

by horizontal ribs, and the valves open directly into the cylinder head and are operated by rockers, as usual. They have an effective diameter of 17-8 inches, and the cylinders, which are 4-inch bore and stroke, have integral heads chambered out slightly to accommodate the valves, as the sum of the outer valve diameters is a little more than the diameter of the piston. All the valves are mechanically operated. The engine speed is stated to be rather low—about 1,000 r. p. m. at the maximum speed of the car on a level road. Lubrication is by splash, and a large 6-bladed fan in front assists the draught.

The Franklin motors have already been fully described in these columns. They embody no new features for the coming year, although some radical improvements have been made elsewhere in the car. The compression of the Franklin motor is understood to be about 65 pounds cold-gauge, and the piston exhaust which distinguishes the Franklin among air-cooled motors is retained.

The same retention of well tried design as regards the air-cooling system may be said of the Waltham-Orient cars, which are made in identically the same cylinder sizes and general form as last year.

The Frayer-Miller motors, which, as is well known, are cooled by a direct blast of air through air-jackets surrounding the cylinders, have been changed only in a few details. The number of pins cast on the cylinder walls has been somewhat increased, especially on the cylinder heads, and the horizontal pipe carrying the air from the fan to the cylinders has been widened slightly at the front end and narrowed at the rear, to give a better distribution of the air. The fan has been entirely changed and is now of the so-called "Sirocco" form. The blades are very short, measuring only about one inch radially, and their outer tips are bent forward in the direction of rotation. This is exactly the opposite of what would be expected, but it is found in practice that the efficiency of the fan thus constructed is fully double what it would be if the blades were bent in the contrary direction. The opening of the air intake is very large, being practically the full diameter between the roots of the blades, as it is found that a smaller opening "strangles" the air current. The speed of the fan is about 2 1-2 times the speed of the engine, or a little slower than before. The fanshaft runs in Hess-Bright ball bearings located above the crankshaft, so that as the latter wears down in its bearings the gear teeth driving the fan cannot jam together. Fan-blade spokes in the flywheel assist the draught materially.

1906 Frame and Spring Construction.

THE intermediate means between the power plant and body on one hand and the wheels on the other are the frame and the springs, which are nearly inseparable in duty, and therefore construction, and form the elements of automobile suspension.

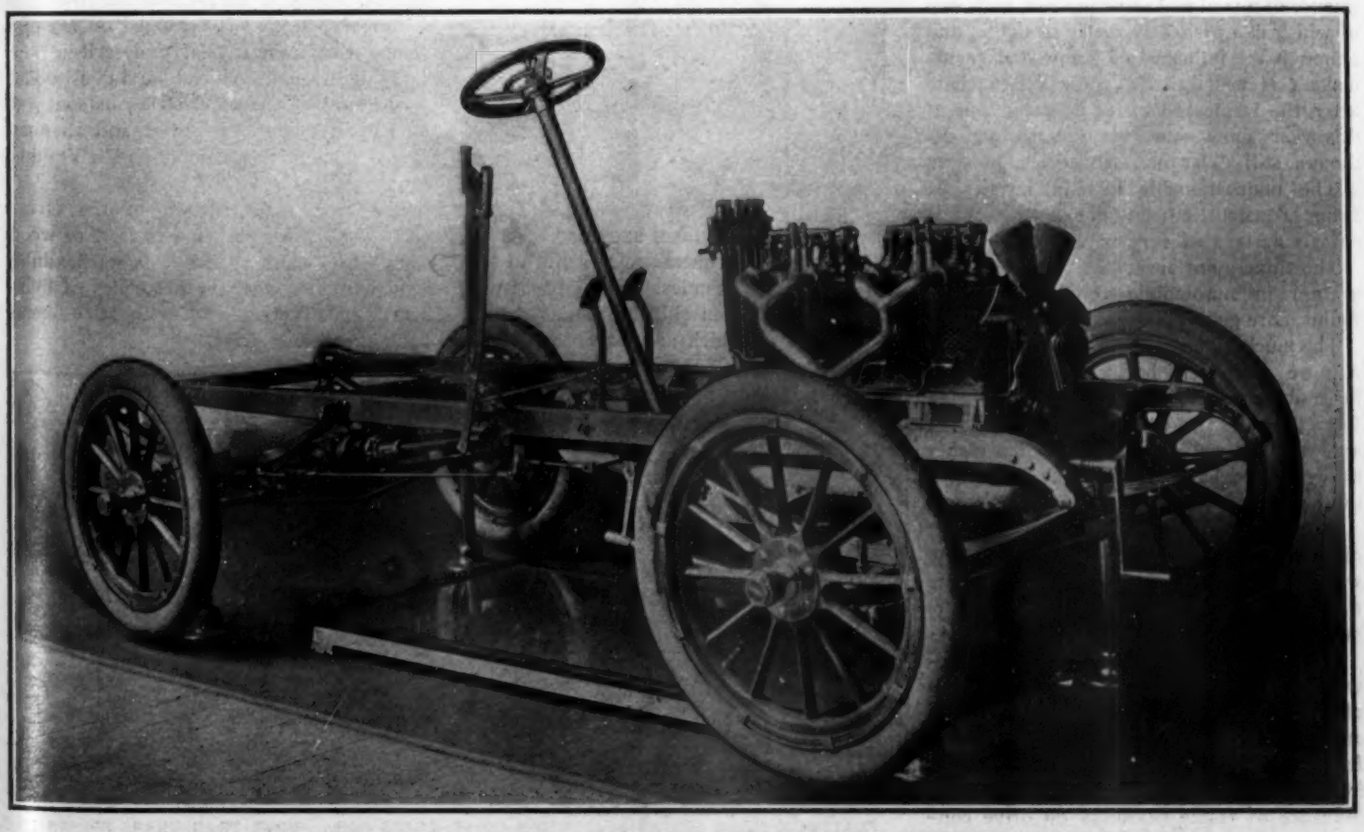
The main object of suspension is a correct relative placing of the constructive elements which shall either be unalterable, forming a rigid connection, or alterable under stress, forming a flexible, usually elastic, interaction.

Rigidity was, up to this year, the paramount, universally approved condition for the power plant, and therefore also for the frame construction as the direct supporter of the same.

But it must be mentioned that several prominent makers, mostly of foreign cars, have for a considerable time manifested their belief in more or less flexible frames, as shown by the nature of their frame construction. In this country, however, stiffness of frame to the utmost possible limit of weight was the general rule up to last season.

The introduction and admirable development of the steel frame fathered this principle, and the historian finds, especially in early constructions, extremes in one-piece frames and designs of cross members and sub-frames, the advantages of which were never in keeping with cost and weight, and furthermore, they never completely responded to the duties they were expected to fill.

The abolition of the rear-entrance tonneau and the introduction of the side-entrance body called for considerably longer wheelbases. Frames, and especially side



CHASSIS OF THE CORBIN FOUR-CYLINDER AIR-COOLED SHAFT-DRIVEN TOURING CAR EXHIBITED IN THE ARMORY.

HEWITT CAR HALF-ELLIPTIC SPRING WITH THREE GRADED LEAVES BELOW THE MAIN LEAF AND TWO ABOVE.

members, had, therefore, to be increased in their dimensions, especially those subject to vertical stresses.

The result was twofold and of rather unexpected character. It was found that a longer wheelbase added to the comfort of riding in reducing vibration, which pointed directly to the advantages of an elastic frame. The increased frame length brought roomier, and thereby heavier body construction, calling for heavier springs, which —manufactured under old rules—were of rather uncomfortable stiffness. On the other hand, such inroads on the stiffness and rigidity of the frame seriously affected the efficiency of the power transmitting devices, constantly throwing them out of line.

Although the change in frame and spring construction is under the rather slow in-

Pope-Toledo. C. G. V.

fluence of a trial and error process, each step of which is a period of nearly one year, and although the influence of frame and spring makers is usually of a conservative character, the frame and spring constructions of this year show some very interesting, although still diverging, tendencies.

The unquestionable loss in rigidity of frame construction brought forth several chassis designs of very bold conception.

The three-point suspension, an old desideratum in automobile construction, has found more general application in 1906 cars.

The much admired C. G. V. chassis shows a pure and well balanced design of a three-point suspension, the three points being formed by the two end supports of the rear axle and the swivel connection of a rather heavy engine base of horseshoe form with the front cross member of the frame.

The Stevens-Duryea is another example of a well arranged three-point suspension, with the added characteristic of absolute rigidity of drive up to the end of the transmission shaft.

The arrangement of a universal joint between clutch and transmission, the absence of which is this year as much an exception as it was a rule last season, is another manifestation of the independence of the designer from frame rigidity, or rather of the decisive influence of frame flexibility on drive construction.

The reaction of the flexible construction of power drive on frame construction was in some cases immediate, as shown by the several wood and wood armored frames of American derivation.

Of prominent foreign firms, the C. G. V. compound frame may be mentioned as rather of unusual prominence. The principle of construction is similar to a box frame, with fishplate reinforcements, but in practice radically different from any other make. The side member as well as front

Pope-Hartford.

Panhard.

SPECIAL FRAME SECTIONS.

and rear cross members are of identical section, showing a seamless rectangular armor enclosing a wooden sill, the manufacturing possibilities of which are rather baffling at first. The actual method is as follows: A second growth hickory or accacia round pole, thoroughly soaked in olive oil, is driven into a seamless steel tube and afterwards rolled to rectangular shape by hydraulic pressure.

It is claimed that this frame combines elasticity and strength superior to any other frame construction. As data on the practical performances of such frame construction are rather scarce, the correctness of this statement is only supported by the sound theory embodied in such design and by the beautifully correct details of other parts of this 75-horsepower chassis.

The side members of this year's Pope-Hartford chassis show a wooden sill with a vertical flat steel reinforcement on the inside. The same construction is shown in the frame of the Lansden electric truck.

This year's Panhard construction shows the combination of a regular channel section pressed steel frame with an ash sill on the outside of somewhat peculiar relative proportions.

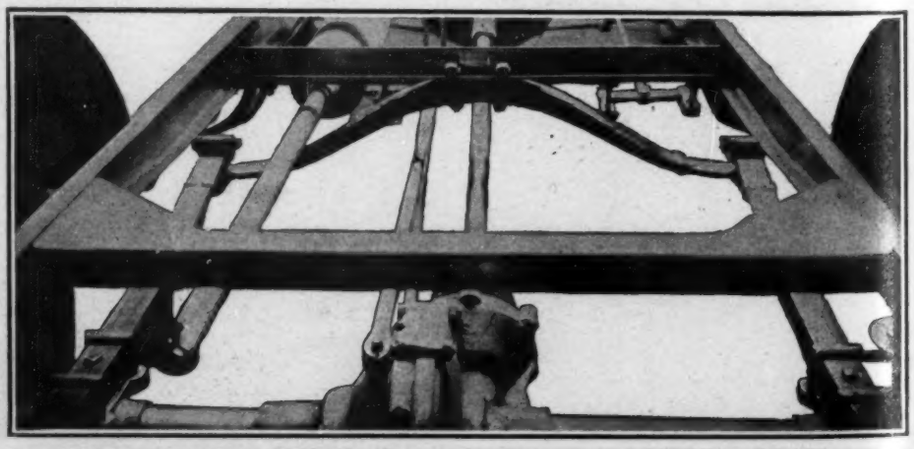
The parallel employment of wood and steel is also shown on the C. G. V. truck

Franklin. Lansden.

chassis, where a simple wooden frame of rectangular section is arranged on top of a composition frame, as before described.

On light weight vehicles we find a wooden frame on the Lansden electric runabout with very light angle iron armor and an unarmored wooden side member on the Franklin runabout.

The frame construction of the Orient buckboard, although being entirely of wood, stands in a class by itself, as its flexibility is in harmony with the principles of buckboard construction and without influence upon the power drive.



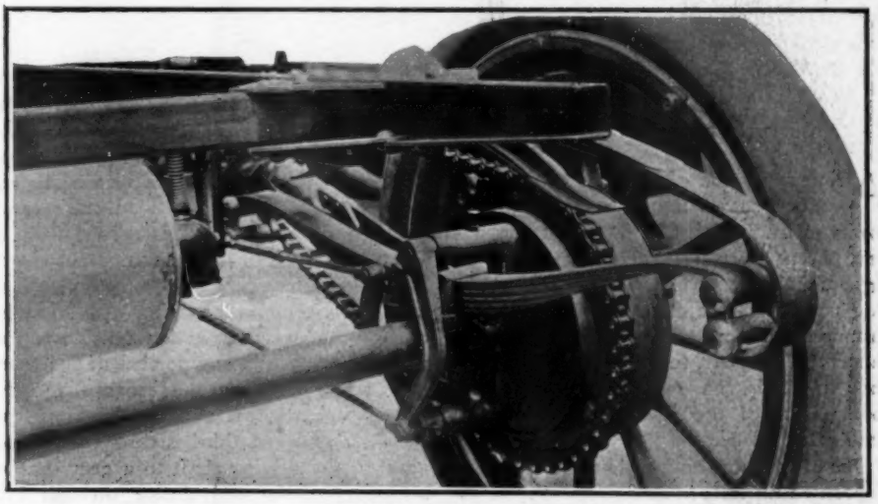
PLATFORM REAR SPRING SUSPENSION OF ST. LOUIS CARS. NOTE TRANSVERSE SPRING IS SHACKLED TO FRONT ENDS OF SIDE HALF ELLIPTICS.

The coming season will probably furnish valuable data on wood armored frames, which might be valuable information for the designers of next season's cars. The majority of frames, however, are still of the channel section, pressed steel type, with a deepening of side members as a characteristic. There is also a noticable increase in the use and dimensioning of under bonnets, constructed in one piece or structurally united with the frames.

The influence of heavier bodies, as before mentioned, but to a great extent also, the increase in vehice speeds, necessitated special care in spring design and selection of material. Complaints in the past about spring stiffness were too numerous to be neglected, and the spring makers found that their years of experience in the manufacture of carriage springs did not quite cover the conditions governing the production of automobile body springs.

This year's models show the efforts of the designer to increase the combined length of synchronous acting spring arrangements, as well as the tendency to eliminate to the utmost possibility any strains on the spring elements other than pure compression.

The standard disposition of springs seems still to be the ancient half elliptic spring, although the length of such springs has been universally and materially increased—the average length being 50 inches for the rear and about 42 inches for the front springs. The leaves themselves have not any more the standard width of 1 3-4 inches, but are usually 2 to 2 1-2 inches wide, and in some instances thinner and "graded." The heavy set that spring leaves usually had seems, happily, to be on the wane and the double shackling of rear springs the rule. It was observed that, in the Léon Bollée the front half of the rear spring acts as a distance rod, its front end being provided with a generous proportioned pivot and the spring seats, naturally free on the axle.



DOUBLE ELLIPTIC SPRING OF THE MARION CAR WITH AUXILIARY SPRING LEAVES UNDER THE UPPER HALF.

A peculiar spring construction is also shown on the Marion car—a full elliptic spring in front with an auxiliary spring leaf on the upper half and only contracting under heavy compression. The same principle is applied to the compound spring in the rear.

The use of the three-quarter elliptic spring for the rear is shown by several prominent makers, which include among others, Panhard (new town car), Brazier and Cadillac.

This construction is considered by some authorities to be superior in spring action to the half elliptic spring, and in looks it is hardly different from the regular frame yoke or hanger.

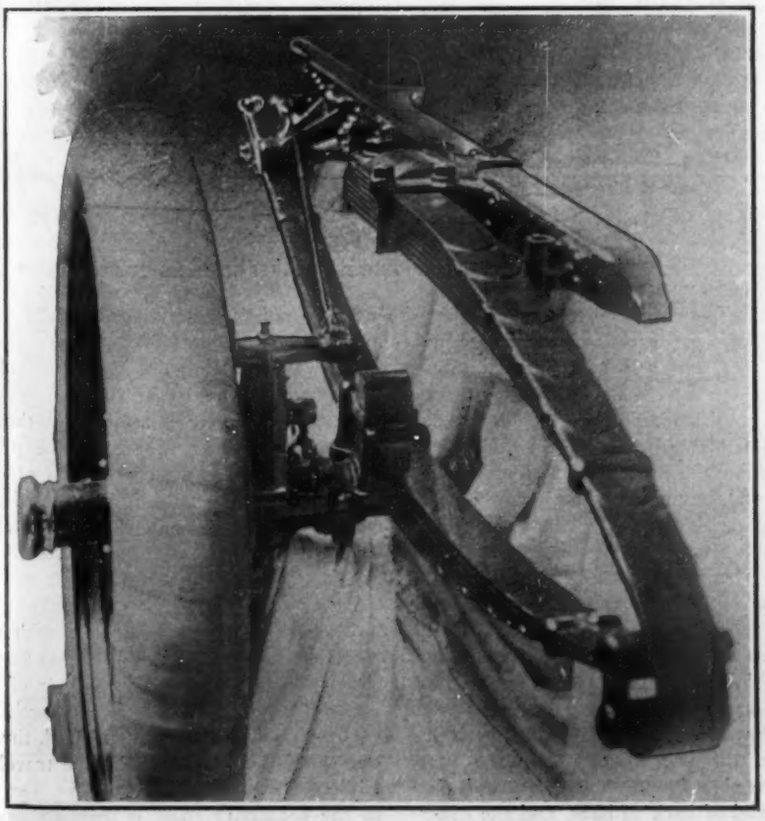
The arrangements of cross springs is usually in the form of a platform spring connecting by double shackles, either with the front or oftener at the rear ends of the rear springs.

A well developed example of this form is shown in the Peerless 1906 model, where the offset rear springs are connected at their rear end with a platform spring, to which center the body is bolted, thereby forming a three-point spring suspension. The leaves of the very long side springs are highly polished to reduce the friction between them, thereby increasing the flexibility of the spring.

An arrangement of a cross spring in front is found on the St. Louis cars, where the front ends of the rear half elliptics are double shackled to a platform spring bolted at its center to a cross frame member.

The platform spring is thereby located under the middle of the body, allowing the standard finish of the rear end of the tonneau, and while offering a long spring action, prevents an excess of swaying of the rear seat.

As an example of a front cross spring, the Moline car may be mentioned. Duryea shows on his runabout his well-known construction of four long double curved quarter elliptics. A very interestingand correct-appearing design of springs was noticed on the Hewitt cars. It consists of a half elliptic spring with the five graded leaves below the main leaf and three above,the leaves not being under any compression when assembled, thus insuring a spring more suitable for different loads than the regular spring construction permits, the upper leaves counteracting the rebound in true spring fashion.



THREE-QUARTER ELLIPTIC REAR SPRING OF CADILLAC SHAFT-DRIVEN CAR.

IMPROVED TRANSMISSIONS AND CLUTCHES.

AN examination of the cars at the New York shows indicates that improvements in transmission systems and clutches have been given serious thought by designers and manufacturers. Very few startling novelties were disclosed, but in many instances refinement of details and re-arrangement of parts, together with improved shop methods, have brought these vital mechanisms of the automobile to a high state of excellence.

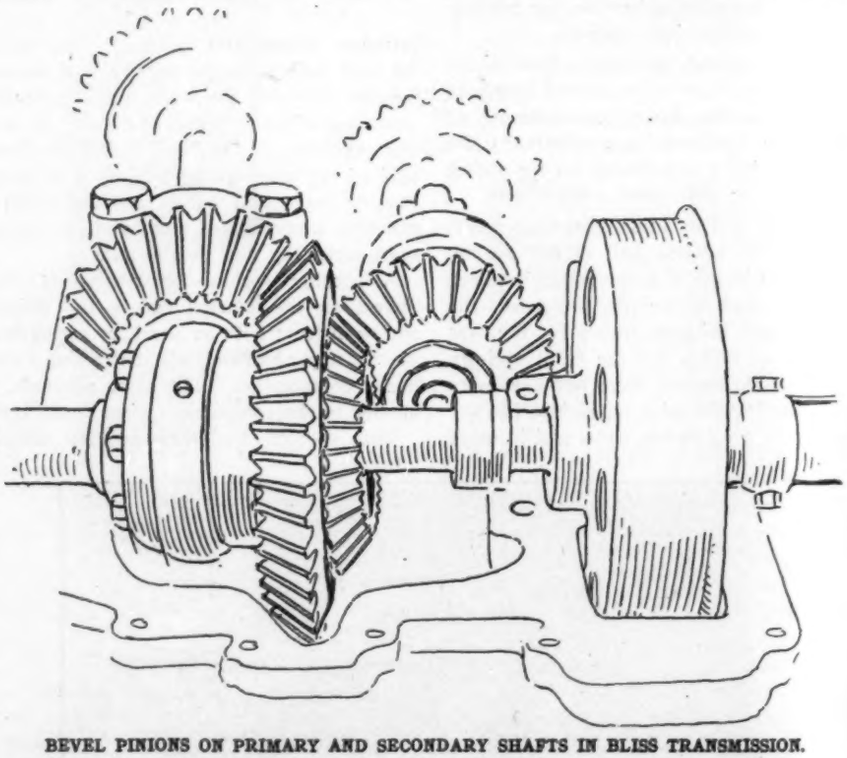
One of the most noticeable changes in the disposition of parts in change speed systems is the tendency towards direct drive, or as nearly direct as possible. In the case of final drive by propeller shaft the construction invariably followed is the well-known lay shaft and clutch-jaw or gear-locked driv··sh ift, which is usually of square section with the train of gears sliding thereon, or, in some cases, mounted slidably as several units, the high speed being obtained by such movement of the gearwheel or clutch-jaws as will effect an engagement with the outside member of the telescoped driving shaft.

In transmissions of this type the drive is direct on high speed; that is. no gears are driving except the pinion and bevel on the rear axle. When low and intermediate speeds are engaged four gears are doing the work; that is, the power is transmitted from the driving shaft to the lay shaft and then back to the outside member of the driving shaft, which member carries the drive to the propeller shaft and rear wheels.

The earlier forms of shaft-driven cars were provided with a simple mechanism in which two gears were employed for each drive, except, of course, that three, as in all clash-gear systems, were necessary for reverse. This same system is still used on a number of foreign cars of the highest grade, but only in the case of final drive by double side chains. Several examples were seen at the shows and the makers claim that the system is economical of energy and that simplicity is a prominent factor in its retention.

For a double side-chain drive the problem of a direct drive on high speed offers more difficulties and in several instances the object of the designer has been to secure this result and also to accomplish a drive on low and intermediate speeds without the use of more than two spur gears.

The most quoted system in which these results are apparent is found in the transmission of the 1906 Mercedes, seen on the Untertürkheim model and on the American copy at the Armory show. In this change speed system the telescoped driving shaft is used, much in same manner as fitted to propeller-shaft driven cars, but instead of the low and intermediate drives being returned to the driving shaft an extra bevel gear is provided, which is driven from a bevel pinion on the lay shaft. In the arrangement great care has been exercised to provide a compact grouping of the parts, and the closest examination fails to reveal any waste space in any portion of the case. The bevel gears on the cross shaft are placed back to back and the drive on low speed, second and third is through the one gear on the driving shaft to a gear on the secondary shaft, and thence through the bevel gear from the pinion on the lay shaft, the outer member of the telescoped part of the driving shaft being free to revolve, necessarily at a slower speed, around the inner member.



BEVEL PINIONS ON PRIMARY AND SECONDARY SHAFTS IN BLISS TRANSMISSION.

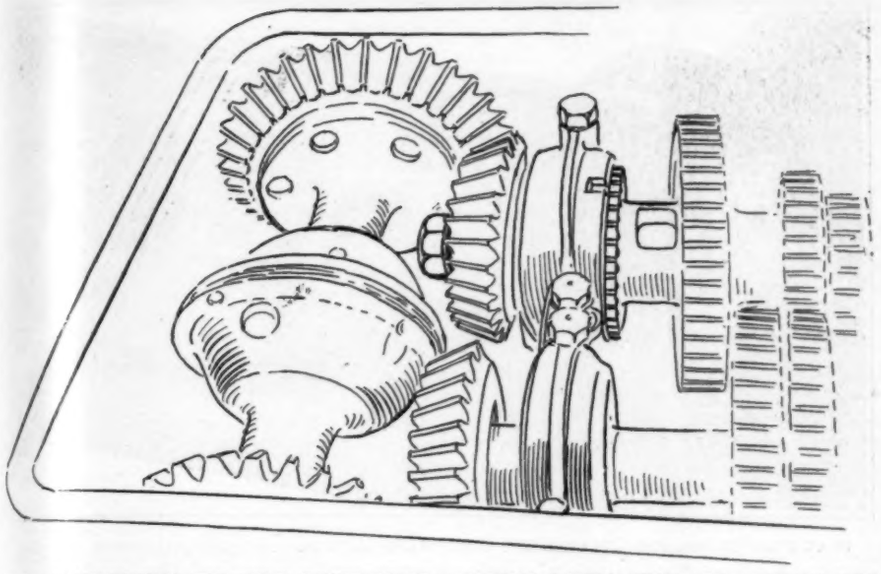
High speed is obtained by the engagement of the third speed gear with an internally cut gear on the beveled pinion at the end of the outer member of the driving shaft, thus locking this shaft so that the drive is direct, no gears driving except the bevel and pinion. The differential is located inside of the change speed case and is in itself a compact mechanism.

This same result has been attained in a slightly different manner in the Züst, an Italian car of considerable reputation abroad but comparatively unknown on this side. In the transmission case the bevel gears are placed upon the cross shaft facing, instead of back to back, and the differential is located midway between the two. However, the result attained is the same and to all intents and purposes the mechanism may be said to provide the same degree of gain in conserving energy. Both the Mercedes and the Züst transmissions owe not a little of their efficiency to the use of ball bearings of the well-known D. W. F. type.

In American motor car practice this result has been reached in the new four-cylinder Knox, recently described at length in THE AUTOMOBILE. The Knox transmission is a fine example of American automobile engineering and the details are carefully carried out and well finished. To reduce friction to the lowest possible point non-adjustable ball bearings are fitted to the shafts.

The direct drive is attained in the same manner as in the Mercedes, the primary shaft members locking by means of an internal gear locking with the third speed gear on the feathered driving shaft. The gear shifts are made by means of a lever working through a gate quadrant and actuating shifter bars.

Another American car built with direct drive on fourth speed and first, second and third speeds through but one pair of gears is the Bliss; but instead of the selective system a progressive gear set is used, the various speeds being secured by the travel of a sliding set on the primary shaft. The drive to the secondary shaft is through any two



ZUST TRANSMISSION FOR SIDE CHAIN DRIVE, SHOWING BEVEL GEARS ON PRIMARY AND SECONDARY SHAFTS AND ON COUNTERSHAFT.

predetermined gears and a beveled pinion on the secondary shaft to a bevel gear on the cross shaft. In the disposition of gears in this transmission the bevel gears on the cross shaft are back to back, as in the Mercedes and Knox.

Variations of the conventional arrangement of disposition of the transmission and cross shaft in cars with double side-chain drive are met with in several machines, notably in the English Daimler, where the driving or primary shaft is located at the bottom of the case with the secondary shaft above and the beveled pinion on the front. The transmission is provided with non-adjustable ball bearings on both shafts, and exhibits careful workmanship. Changes are made by means of a selective lever in a gate quadrant with a separate lever for the reverse.

The usual longitudinal arrangement of primary and secondary gear shafts has an exception in the Pope-Toledo, in which car the shafts are set transversely across the frame, the drive being taken from a bevel pinion at the end of a short propeller shaft. Variations of the typical transmission arrangement are found in such cars as the Stevens-Duryea, Northern, Buick, Maxwell-Briscoe and others where the crankcase of the engine and the transmission case is either an integral part or the two are rigidly connected to form a unit.

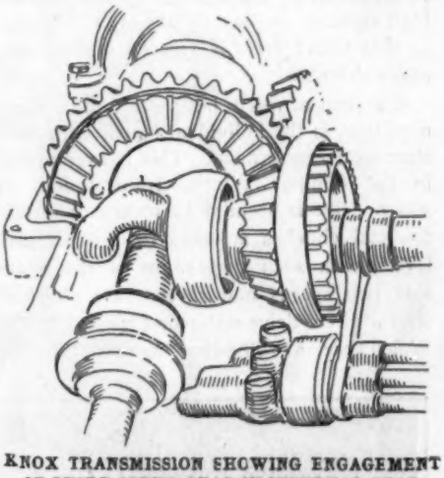
A well-planned transmission set is to be found in the Peugeot, where the change speed is self-contained and drives to the cross shaft through a short propeller shaft and a universal joint, the beveled gear and pinion with the differential being housed in a separate casing a considerable distance to the rear of the change speed.

A transmission brake, of generous dimensions, is also contained within the rearmost case, the other service brake being located on a drum on the short propeller shaft, just at the rear of the change speed. This disposition of the transmission admits of the use of very short chains on a chassis of extra length and minimizes troubles from distortion of the frame under adverse road conditions and high speed.

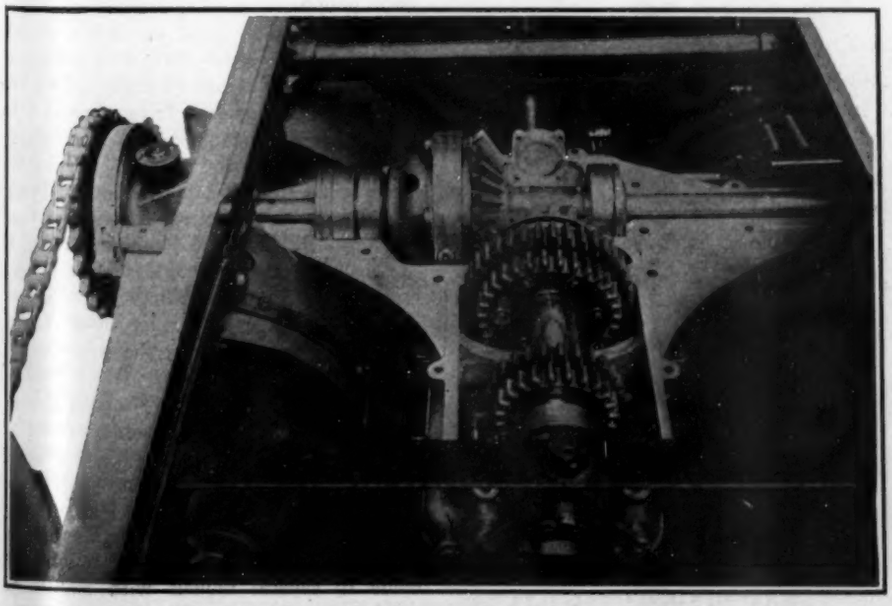
A somewhat similar arrangement is found in the 60-horsepower Clement-Bayard where the bevel gears are housed in a separate case, which, however, does not contain a brake, this mechanism being enclosed in a separate compartment.

There seems to be a growing tendency on the part of builders of cars of high power to include a service brake as a contained member of the transmission, the purpose being to afford perfect protection to the braking surfaces and lubrication of the parts.

The growing popularity of the selective system of gear engagement has resulted in the use of shorter transmission assembly, and in a number of instances advantage of this fact has been taken to provide a universal joint between the clutch and the change speed. Even in the type of change speed in which the sliding gears are a unit, care has been taken to keep the dimensions within certain limits, and transmissions are far less cumbersome and seem more fitted to the improved chassis of this year.



KNOX TRANSMISSION SHOWING ENGAGEMENT OF THIRD SPEED GEAR IN INTERNAL GEAR CUT IN BACK OF BEVEL PINION.



PLAN VIEW SHOWING DISPOSITION OF SHAFTS AND GEARS IN ENGLISH DAIMLER TRANSMISSION.

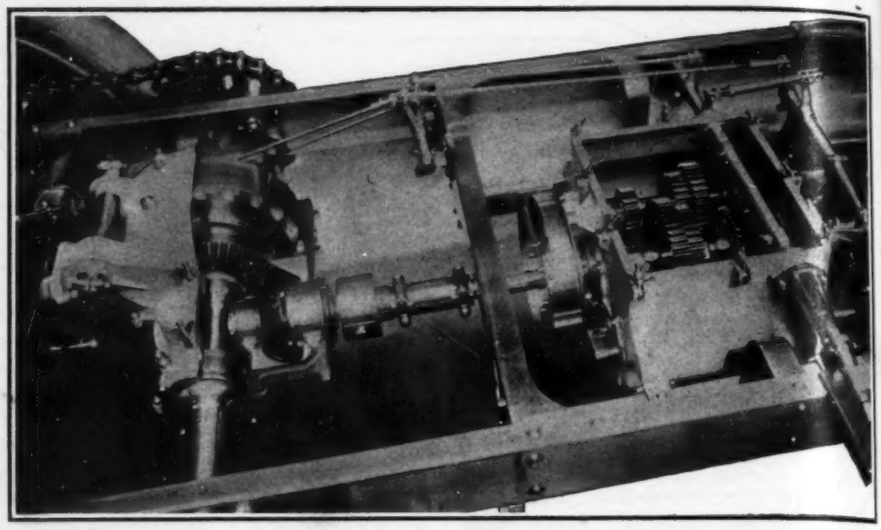
In a number of instances the maker has deemed it wise to provide for the engagement of the reverse by means of a special lever. This is seen on the Packard, Napier, English Daimler, Austin and other cars. The method of control is to place the gears in neutral position by means of the forward speed-change lever and then bring the reverse into engagement by a movement of the second lever. In a number of transmissions this is effected by means of a wide pinion which may be dropped or raised to engage with the first speed gears on both the primary and secondary shafts. In the case of the Frayer-Miller car the swinging pinion is actuated by a movement of the same lever that actuates the other changes of speed.

The disposition of the transmission system in nearly all cars in which clash gears are used is between the motor and the rear axle, usually well forward, but exceptions, such as the Packard and the new four-cylinder Northern, may be noted. In both the three-speed and reverse transmission is contained within the combined bevel gear and differential case at the center of the rear axle, the Northern rear axle only being illustrated, as the Packard is a familiar assembly.

That the planetary change speed is a reliable mechanism is evidenced by a number of examples to be found on cars of high power and considerable cost, the Ford new six-cylinder and the two high-power, four-cylinder Cadillacs being prominent examples. In cars of moderate cost the planetary system is holding its own and a number of refinements and greater care in processes of manufacture give promise of a continuation of this excellent mechanism. In the Cadillac the use of three speeds instead of the usual two and reverse is worthy of note. In all planetary transmissions examined the high speed is obtained by locking the system so that direct drive is secured without any gears driving.

A system of merit, but not found in many machines, is the individual clutch with constant gear engagement. This is exemplified in the familiar Winton transmission, in which drive is secured by means of metal-to-metal clutches actuated by suitable side levers with such disposition of the gears that two speeds and reverse are obtained with a direct drive on second speed. In the Welch car a somewhat similar type of transmission is found, but drive is effected by means of multiple disk clutches, the same number of speeds being obtained as in the Winton, and also direct drive on second speed. The disks are of steel and bronze, six and five, contained in an oil-tight case which is provided with hollow ears to carry the bronze disks, the alternate steel disks being carried by the hexagonal shaft which has a bearing inside the primary shaft.

An ingenious oiling device is provided, too, for the lubrication of this bearing. A thin steel disk is attached to the outer member of the telescoped shaft and to the face of this plate is brazed a small spirally bent copper tube with the inner end in communication with the bearing. As the shaft revolves in the transmission case oil is picked up at each revolution and carried direct to the bearings surfaces.



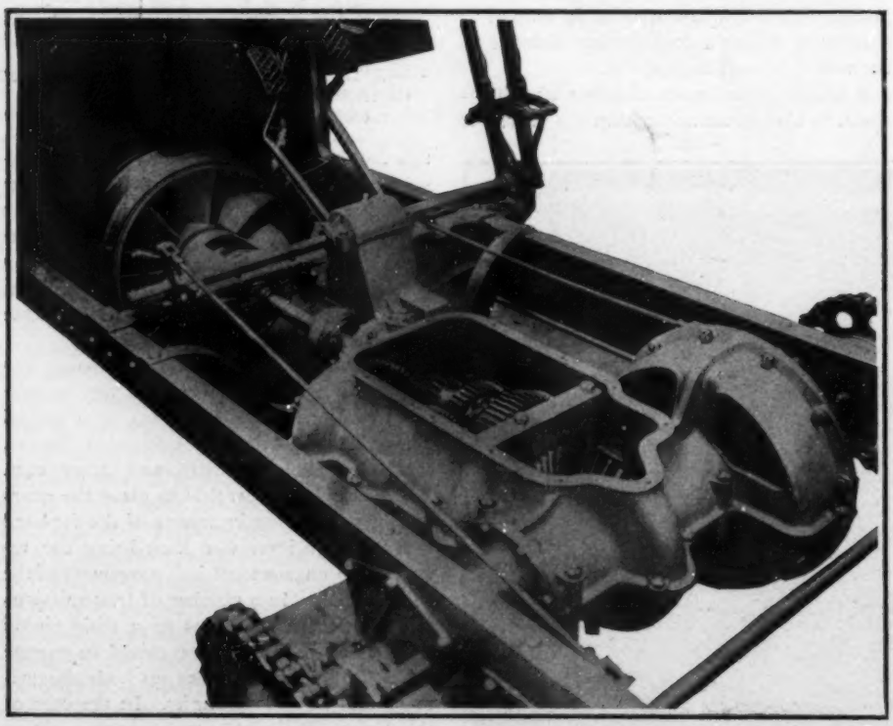
PLAN VIEW OF PEUGEOT CHASSIS SHOWING SHAFTS AND GEARS OF TRANSMISSION SYSTEM.

A new idea in transmissions to be exhibited at the shows is the Belden which possesses several features of the clash gear, but the shape of the gear wheels meshing for reverse and first and second speeds is along new lines. The system, which may be used for either double chain or propeller shaft drive, is dependent for its action on a gear driven disk which is slidably mounted to be thrown into and out of engagement with a specially shaped gear mounted on the splined rear axle or differential cross shaft in such a manner that the limit of its travel in one direction causes it to interlock, by means of jaw clutches, with the bevel gear secured to the shaft. The face of the disk is provided with two sets of conical studs concentrically placed which engage with the traveling gear wheel on the cross shaft, the studded wheel driving through teeth on its periphery which engage with a spur pinion on the propeller shaft, forward of the usual bevel pinion.

To engage first speed the disk is moved away from the cross shaft, this movement disengaging, by means of linkage, both the studs and the spur gear drive when suitable transverse movement carries the sliding gear into position for engagement with the inner set of studs, further movement of the change speed lever setting the disk into engagement with the spur pinion and carrying the disk toward the cross shaft and into engagement with the sliding gear. Second speed is obtained by further travel of the slide gear, and reverse by the travel of the slide gear past the center.

The consideration of transmission devices would be incomplete without reference to the friction drive system which is seen on a number of cars and as a special demonstration on several chassis.

One of the best known devices of this kind is found on the Lambert car which is made in several models with motors of different horsepower. The final drive is by means of double side chains, from sprockets



PART VIEW OF CHASSIS OF C. G. V. CAR SHOWING CONE CLUTCH WITH FAN BLADES IN FLYWHEEL AND CASING INCLOSING CHANGE SPEED GEARS AND DIFFERENTIAL. CIRCULAR CASING ON RIGHT REAR OF GEAR BOX INCLOSES SERVICE BRAKE.

carried at the ends of the splined cross shaft which is held at a constant distance from the rear axle by means of adjustable distance rods. This cross shaft is provided with a differential and a brake drum. The engine shaft is extended rearwardly and at the end a large disk, faced with an aluminum alloy, performs the double function of fly wheel and driving member of the system. On the splined cross shaft is mounted a light wheel with compressed paper rim. This wheel is brought into engagement with the driving disk by suitable linkage, actuated by a foot lever, the position, and consequently the speed of the vehicle, being regulated by means of a side lever moving over a notched quadrant. For all practical purposes the five speeds notches provided are sufficient, though any graduation between zero and maximum is possible. The reverse is obtained by a movement of the sliding member past the center.

The "Windsor" transmission is called by the makers a double rolling traction. Two large disks are carried as flywheels from the engine, and between these disks are located two driven wheels which operate two countershafts, carrying at their ends sprockets for the side chain drive. A suitable lever brings the driven wheels in contact at points diagonally opposite, the forward engine-driven disks driving one transmitting disk and the rear engine disk driving the other. In effecting this contact the driven disks are each independently driving the rear wheels, sufficient differences of peripheral speed and slight slippage are claimed by the makers to obviate the necessity of a differential gear. Various speeds are obtained by sliding the driven wheels in and out from the driving shaft, a suitable hand wheel above the steering wheel being provided for the purpose. The contact of the disks is controlled by a side lever working over a ratchet sector. To bring the reverse into action the contact of the driven disks is reversed, the front and rear engine disks driving from the diagonally opposite points engaged for drive ahead.

Another transmission acting through the medium of friction disks and eliminating gears is the "Gearless," which is so arranged that when high speed is engaged the disk drive is idle. This result is attained by driving through three disks for low, intermediate speeds and the reverse, the driving disk being slidably mounted on a shaft in line with the engine shaft and the limit of the forward motion engaging a suitable clutch with the flywheel hub so that the turning movement of the motor is carried to the driving wheels without effort on the part of the friction disks.

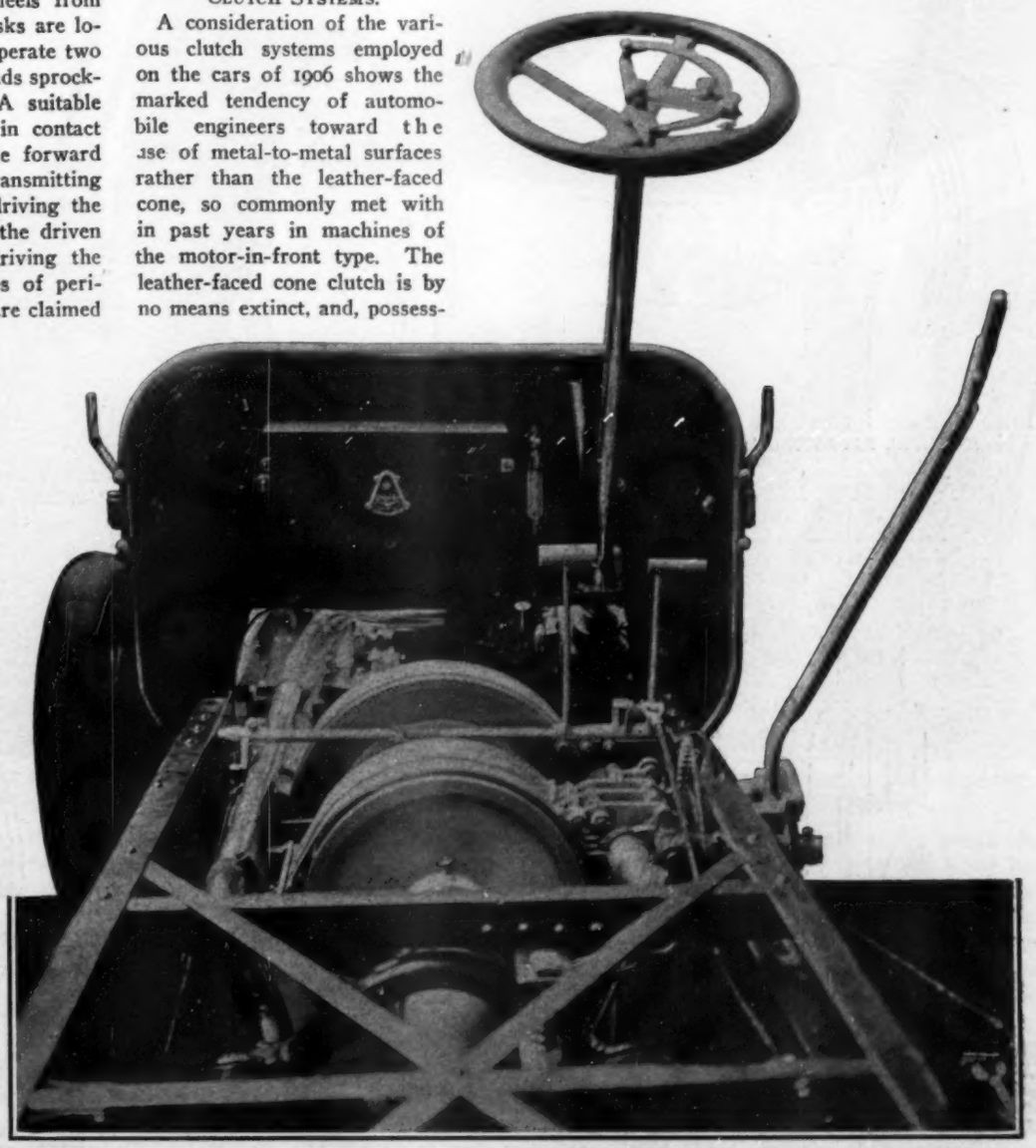
In the arrangement of the various parts the drive is first from the flywheel rim to the periphery of two smooth-faced disks which are mounted at right angles to the engine shaft with provision for movement to and from the shaft. On a splined shaft is carried a third disk, this shaft being free to turn in either direction with reference to the engine shaft but in line with it. When it is desired to engage a speed the side disks are drawn away from contact with the driven wheel by means of a foot lever acting through suitable linkage and cams, and the driven disk is carried to the position desired on the splined shaft, when the side disks are brought into contact by means of the foot lever, two cams acting in unison so that the pressure is applied evenly from both members. Engagement of high speed causes the side disks to remain out of contact with the driven disk.

Clutch Systems.

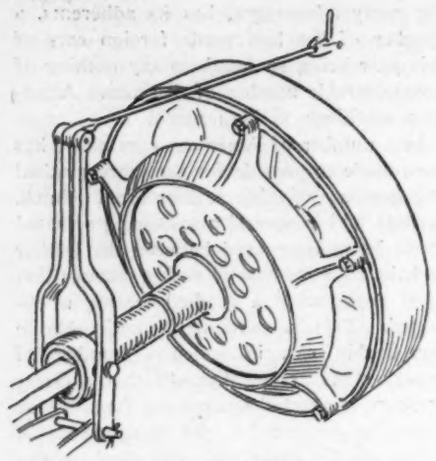
A consideration of the various clutch systems employed on the cars of 1906 shows the marked tendency of automobile engineers toward the use of metal-to-metal surfaces rather than the leather-faced cone, so commonly met with in past years in machines of the motor-in-front type. The leather-faced cone clutch is by no means extinct, and, possessing many advantages, has its adherents, a number of the best made foreign cars of this year being so fitted, to say nothing of a considerable number of distinctive American machines of high merit.

In a number of American cars effort has been made to provide for the more gradual engagement of the leather-faced clutch, springs, and in several cases spring actuated studs being interposed between the leather and the male member in such a manner that upon engagement a gradual seating is obtained. This is particularly noticeable in the Corbin car, in which a number of bronze studs are so disposed that a direct pressure is exerted against the female cone when the clutch is let into engagement. A device of the same nature is used on the Columbia and is said to contribute to the "sweetness" of clutch engagement in a marked manner.

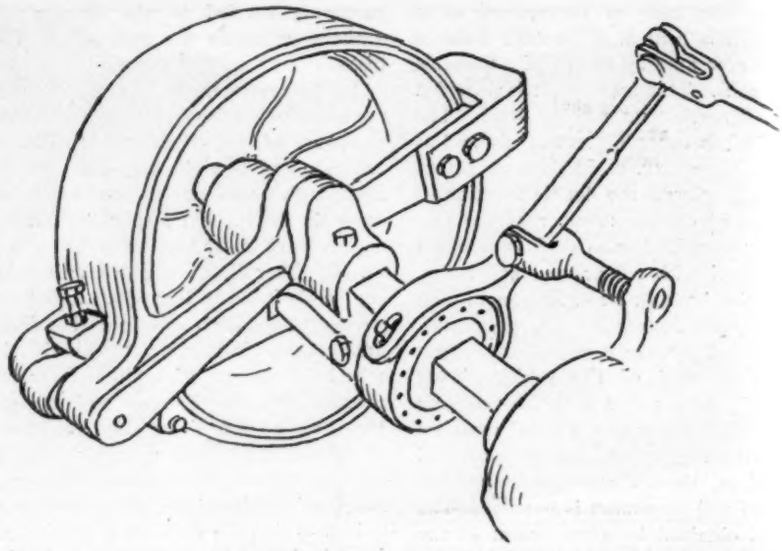
The impossibility of building a fan in the flywheel has been urged as an objection to the conical leather-faced clutch, but in a



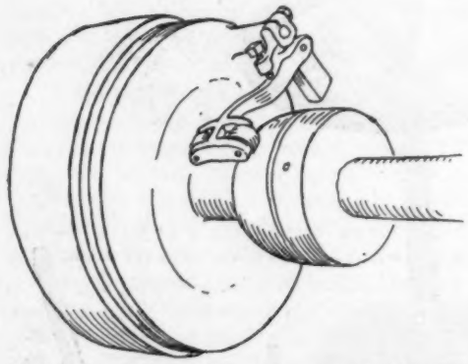
CHASSIS OF CADILLAC 4-CYLINDER TOURING CAR SHOWING PLANETARY 3-SPEED TRANSMISSION ACTUATED BY SIDE LEVER.



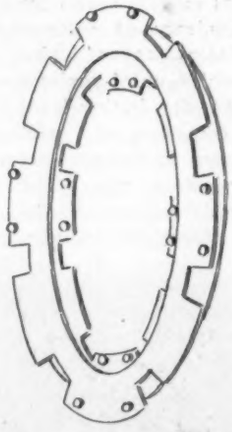
FRAYER-MILLER REVERSED CONE CLUTCH WITH PERFORATED REAR PLATE TO FACILITATE AIR COOLING.



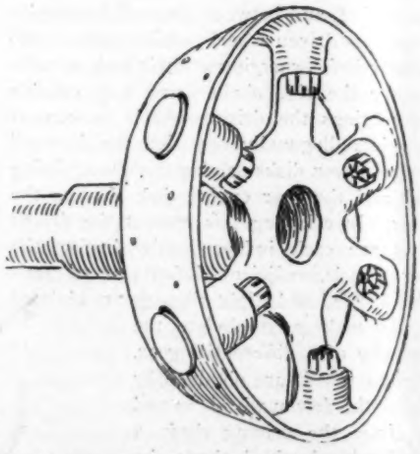
APPERSON EXTERNAL CONTRACTING BAND CLUTCH AND OPERATING MECHANISM



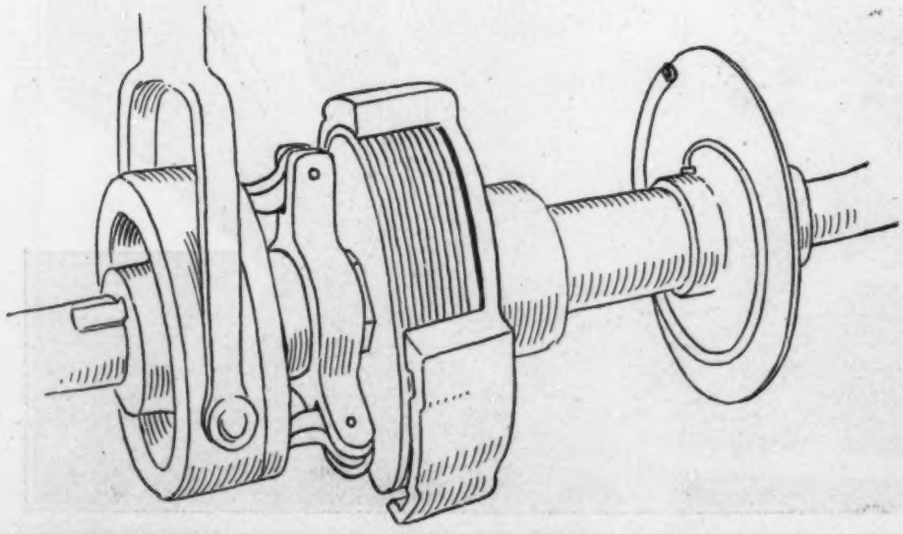
ELMORE SLIDING CONE AND ARM ACTUATING INTERNAL EXPANDING RING CLUTCH.



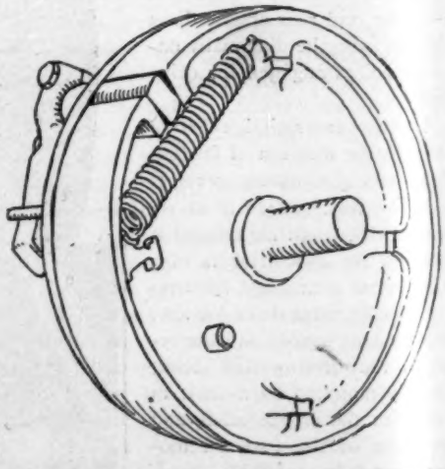
TWO ADJACENT PLATES OF ZUST MULTIPLE DISK CLUTCH SYSTEM.



MALE MEMBER OF CORBIN CLUTCH WITH SPRING ACTUATED STUDS IN FACE TO PROVIDE PROGRESSIVE ENGAGEMENT.



INDIVIDUAL MULTIPLE DISK CLUTCH OF WELCH TRANSMISSION. SPIRAL TUBE ON PLATE AT RIGHT IS USED FOR CONDUCTING OIL TO TELESCOPED SHAFT.



FRONT VIEW OF INTERNAL MEMBERS OF ELMORE EXPANDING RING CLUTCH. NOTE LUGS ON PLATE AND RING TO KEEP RING CONCENTRIC.

notable instance this issue has been met with success. The C. G. V. is provided with a fan of generous dimensions not only in the flywheel but in the male member of the clutch as well. The vanes extend well outward and well into the hub, so that high cooling efficiency is obtained without abandonment of the cone type.

A supplementary flywheel fan is employed in the Frayer-Miller car, the reversed female cone being carried from the rim of the flywheel by means of a spider with suitable perforations in the male member of the clutch to permit the free passage of air thrown from the vanes on the flywheel.

A popular type of clutch at this time is the multiple disk, which is well known by reason of its use on a number of American cars well established in favor. One of the prime advantages of this clutch is the ease with which it may be inclosed within an oiltight and dustproof case, a condition contributing not a little to the facility of car cleaning and general up-keep of the power plant.

The Maxwell-Briscoe and Stevens-Duryea are two cars which have used this type with entire success, the mechanism of both cars being favorable to the application of the multiple disk clutch.

In the multiple disk clutch a number of plates of metal are alternately attached to the engine shaft and the transmission shaft, being brought into engagement by suitable spring pressure, with the result that contact of the surfaces takes the drive from the engine to the transmission system. In the choice of metals the matter is entirely a subject of experimentation or preference on the part of the manufacturer, one using polished steel against hardened steel which has been slightly warped in the tempering process, another bronze against steel, and another leather-faced plates bearing against hardened and highly polished steel.

In a number of multiple disk clutches the several members are made of very thin sheet steel with suitable projections formed on the outer and inner edges to prevent the alternate plates from turning when out of engagement.

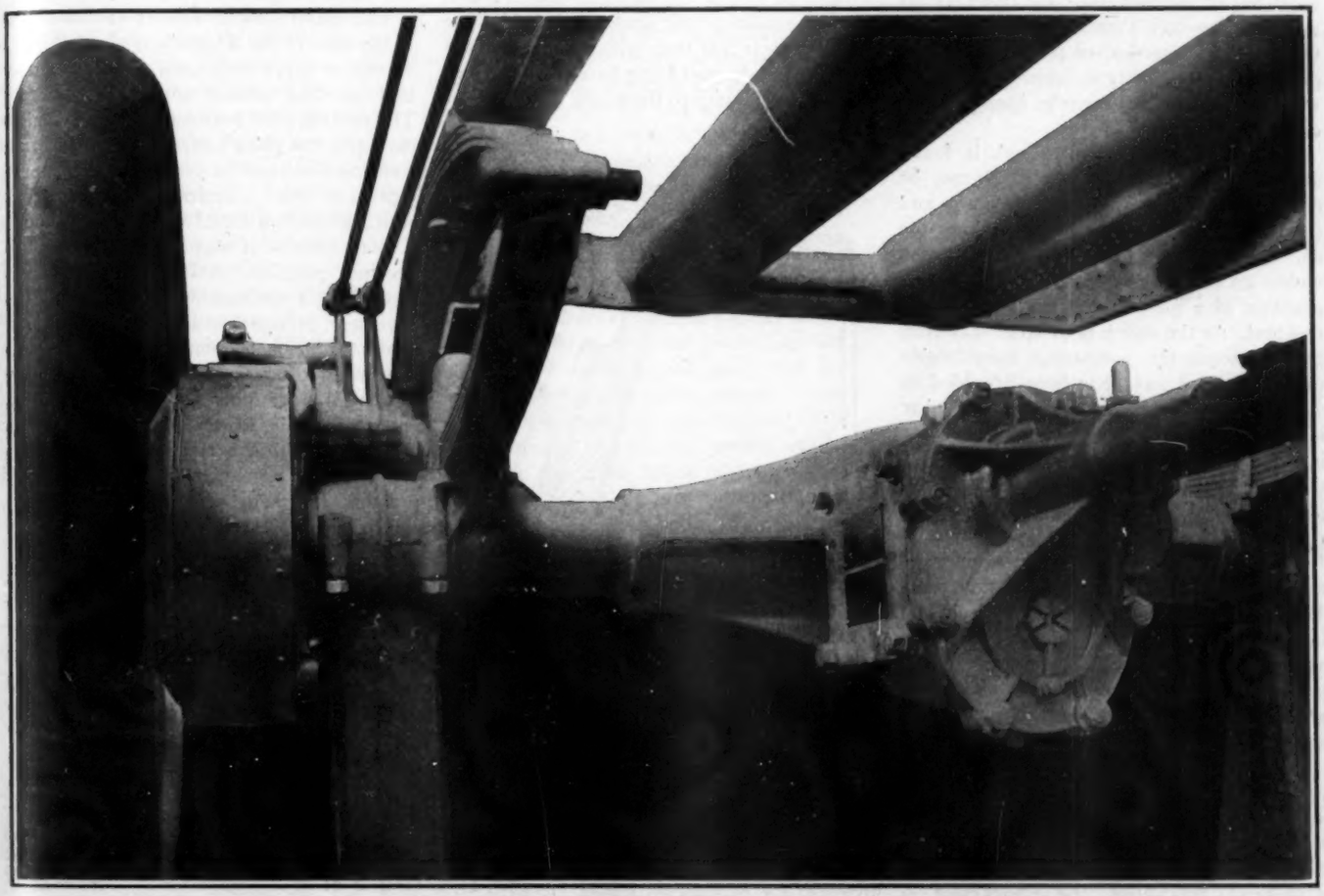
In the arrangement of the engine crankcase and transmission case as one unit, as in the Stevens-Duryea, the Maxwell-Briscoe and the four-cylinder Buick, the multiple disk is almost the only type possible without unduly increasing the dimensions of the compartment enclosing the mechanism.

The helical clutch as used on the Mercedes is found in several instances, and when carefully made is a satisfactory means of engine engagement. Its small size and the ease with which it may be enclosed in an oiltight and dustproof case contribute to the advantages which it possesses as a ready means of engagement of the drive. The principle involved is a constricting helical spring around a suitable drum, the pressure necessary for complete engagement being applied progressively, so that gradual starting of the car on various speeds is insured.

Generally speaking, the manufacturers of cars provided with transmission devices of the planetary type have not seen fit to equip their machines with separate clutches, depending on the constricting band on the planetary drum for engine disengagement, but several exceptions were revealed, notably in the Elmore and in the four-cylinder Cadillacs.

The former is provided with an internal expanding clutch designed much on the lines of the usual rear wheel brake. The expanding shoe is actuated by means of a sliding cone which is mounted on ball bearings on the transmission shaft, a forward motion of this cone engaging the clutch through suitable mechanism. The expanding member has a bearing against a drum mounted on the engine shaft by means of a universal joint. The expanding shoe is prevented from contact with the engine shaft drum when the clutch is out of engagement by means of small lugs which rest against corresponding lugs on the driven member.

In the Cadillac a plate clutch is interposed between the engine and the transmission, the drive being by means of the



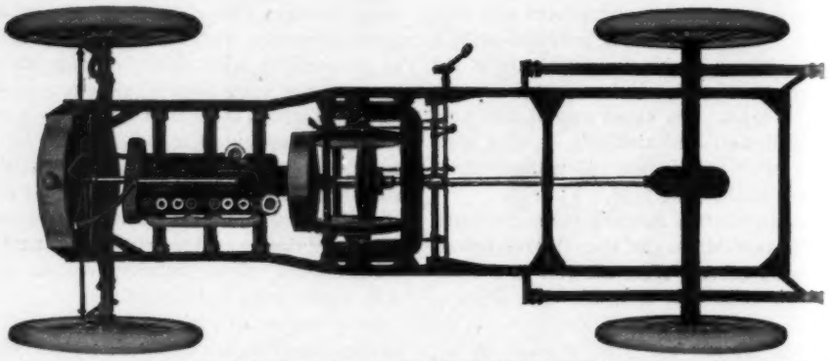
VIEW OF THE NORTHERN REAR AXLE FROM UNDERNEATH THE CAR FRAME. NOTE GEARBOX ON BACK AXLE CONTAINING CHANGE SPEED AND BEVEL GEARS, AND DIFFERENTIAL. ALSO NOTE WIDTH OF BRAKE FACE AND DOUBLE BARREL MUFFLER.

contact—through the medium of eight small helical springs—of large diameter plates located in the flywheel. The actuation is by two cams on the transmission shaft, brought into action by a rocking lever which revolves the cams in opposite directions around the shaft.

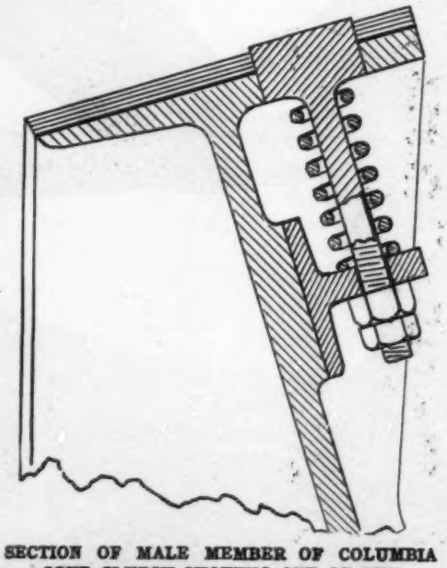
An external contracting clutch is found on the Apperson and Haynes cars. It is of simple construction and light in weight, so that there is no great momentum imparted to the primary shaft of the transmission when the engine is disengaged. The movement of the cam-shaped sliding finger on the hub effects a constricting effort of the band by means of the lever which is carried inwardly from the two ends of the band which are connected, one to the supporting arm radiating from the hub of the free member and the other to a short crank at the end of the lever. The action of the clutch is progressive and the drive is taken up smoothly with positive hold when the band is fully engaged.

The metal-to-metal cone clutch is found on a number of cars, among which may be mentioned the new four-cylinder Knox and the Napier six-cylinder. In the former the clutch is of large diameter and enclosed within an oiltight case provided by the application of a plate to the rear face of the flywheel. As the clutch is of large diameter, and consequently possessing considerable momentum, a means has been provided to slow up the speed when the driven member is disengaged for changing speeds. A plate is fitted to the transmission shaft a short distance back of the flywheel and a sliding plate of like diameter mounted on two rods rigidly attached to the frame with springs for keeping the slidable plate out of engagement, except when under compression from the linkage interconnected with the declutching pedal. The contact of the revolving plate with the stationary one exerts sufficient braking effort to slow the clutch and the primary gear shaft, contributing to the ease and safety of gear engagement.

The internal expanding segmental clutch, patterned after the familiar internal expanding rear wheel brake, has been adopted by a number of representative concerns, and when encased in an oiltight compartment, with ample lubrication, the engagement is progressive and the drive positive. Declutching effects an instantaneous release, and by reason of the small size of this type the inertia is less than with the cone clutch and changes in speed may be made with comparative immunity to the gears. The Berliet clutch is of this type, with two expanding segments, the entire mechanism being enclosed in the hub of the flywheel and of such small diameter that the vanes in the flywheel are of sufficient size to provide air circulation without the use of a fan between the radiator and the motor.



PLAN VIEW OF THE "GEARLESS" FRICTION TRANSMISSION WITH ARRANGEMENT FOR DIRECT DRIVE ON HIGH SPEED.



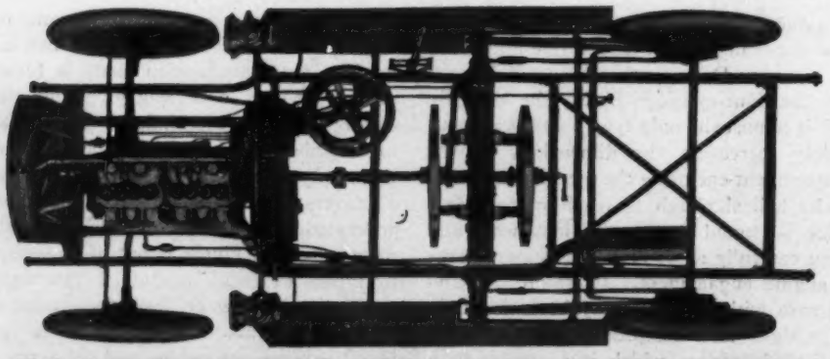
SECTION OF MALE MEMBER OF COLUMBIA CONE CLUTCH SHOWING ONE OF THE SPRING ACTUATED PLUNGERS FOR PROGRESSIVE CLUTCH ENGAGEMENT.

The use of a small number of disks, three in the case of the Thomas, is a modification of the multiple disk type, and as used on this car has proved entirely satisfactory. The floating plate between the engine driven disk and the plate attached to the primary transmission shaft is perforated for the reception of small cylindrical sections of cork, which provide gradual contact by inducing a small amount of slippage before the drive becomes positive. A helical spring under control of a declutching fork provides the necessary pressure to bring the plates into contact for engagement of the drive, the separation of the plates being assisted by means of four pins connected with long levers extending inwardly to the hub of the sliding transmission member.

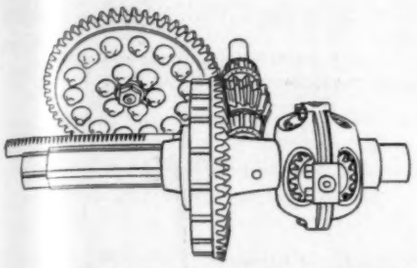
In the Autocar clutch, which has remained practically unchanged for a number of years, a floating bronze ring is used to take up the drive and the necessary pressure is provided by three toggles which are adjustable and so designed that the drive is positive after the pressure applied by means of a strong helical spring carries the toggles past center. The bronze ring is loosely attached to the flywheel at four points on its circumference and is provided with a number of cork sections extending through its face to contribute to progressive engagement. In the runabout made by the Autocar company the clutch engagement has been changed from hand to foot control, the conventional arrangement of this important function.

A discussion of all the clutches shown on the cars of 1906 would call for detailed descriptions in nearly every case, as manufacturers are working independently, although along similar lines, for the improvement of this mechanism of the automobile. In the way of decided novelties, but one type was shown which departed from previous practice in the principle involved. This was found in the new four-cylinder Northern, a car fairly bristling with features, the pneumatic clutch providing a type which has hitherto been absent from automobile exhibitions.

The clutch is contained within the flywheel, which has a series of fan vanes cast around the clutch-enclosing hub, which is



PLAN OF CHASSIS EQUIPPED WITH WINDSOR "ROLLING TRACTION" FOUR-PLATE TRANSMISSION.



PERSPECTIVE VIEW OF BELDEN TRANSMISSION.

so built up that an airtight compartment is formed for the action of a heavy leather flexible diaphragm. This diaphragm is clamped around its periphery in such a manner that it has a slight movement fore-and-aft within the circumferential points of attachment. Back of the diaphragm is a smooth steel disk which is affixed to the transmission by means of a universal joint contained in the bronze hub of the disk, the drive going to the rear wheels by means of a propeller shaft and a sliding gear transmission located on the rear axle. The smooth disk has a backing of leather and fiber which is circumferentially attached to the flywheel and supported throughout a sufficient part of its superficial area to provide an unyielding seating when the clutch disk is forced into engagement.

The requisite air pressure to effect an engagement of the clutch is provided by an air pump driven off the camshaft of the motor, with suitable piping to carry the compressed air to the forward end of the crankshaft through which a 3-8-inch passage is formed to admit the air to the forward side of the flexible leather disk. The operation of admitting air and of effecting a release of the clutch is performed through the medium of a small finger lever set above the steering wheel and connected to a two-way valve.

It is obvious that if sufficient air pressure is admitted to the restricted compartment between the flexible disk and the inner face of the forward member of the flywheel that the frictional contact of the leather disk and the leather-faced backing will grip the transmission shaft plate and transmit the turning effort of the motor to the propeller shaft and rear wheels. In practice the device is said to work with the utmost smoothness and highest efficiency, clutch engagement being progressive by reason of the gradual application of the actuating medium and of slight slippage of the driven disk, which, however, is entirely absent after complete engagement.

The air pump is located at the rear of the engine in an accessible position and is fitted with a safety valve which is set to relieve the pressure when fifty pounds per square inch has been pumped up.

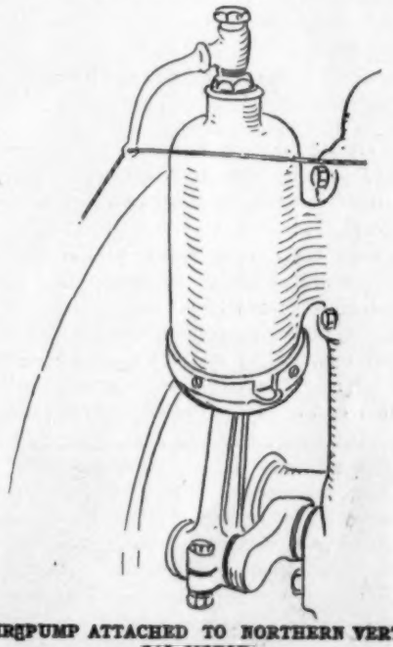
VIEWS OF FRANKLIN MULTIPLE DISK CLUTCH ASSEMBLED AND APART.

Methods in Brakes Seen at the Shows.

OF the brakes in common use on automobiles, as displayed at the New York shows, the external type consists of either a flexible band attached to some portion of the stationary part of the chassis at a point in the middle of the length of the strap and drawn together at the ends for gripping the brake drum by aid of end attachments in one of which a bell crank is hinged, and the other having an adjustable link connecting it to the bell crank by pin connection; or of two rigid parts each extending nearly half way around the drum, and hinged so as to open and close in the manner of the shell of the clam. The support to the stationary part of the machinery is usually at the hinge. The two free ends are then drawn together in a manner similar to the band type for gripping the drum, arrangements being made for adjustment to take up wear.

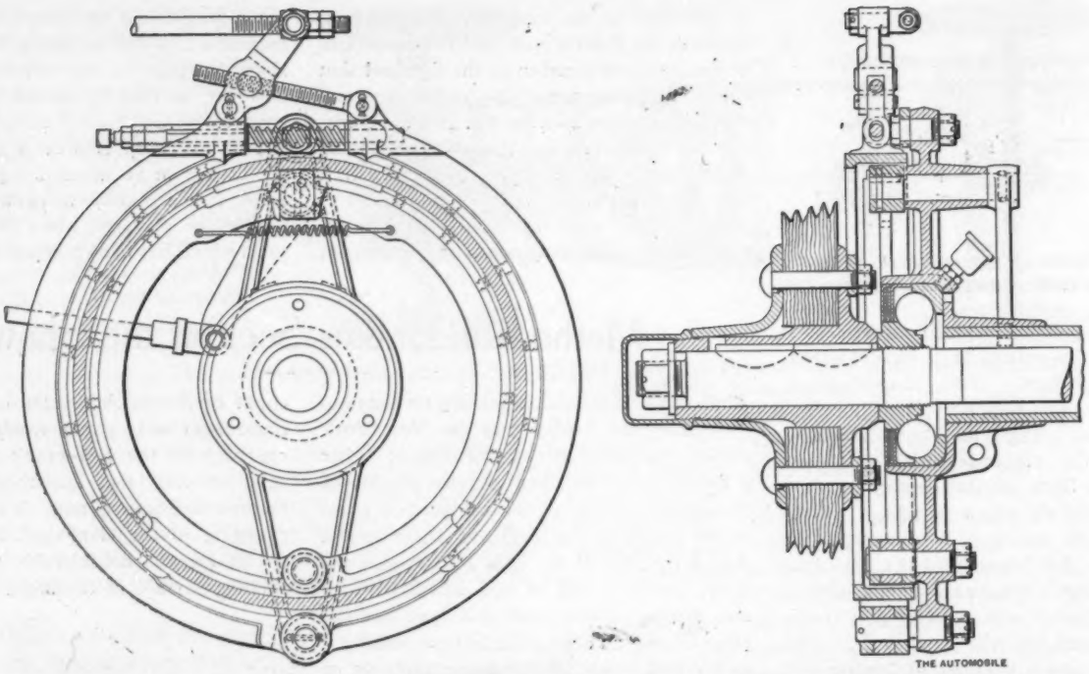
The internal type is the reverse of the external in its action, but is otherwise very similar, one operating by the expansion of a flexible ring fastened to the frame of the machine at about the middle of its length, and the other consisting of two similar rigid parts hinged together and opened by a bell crank or cam between their ends to set them out against the internal cylindrical brake surface.

It may be noted that in either the external or internal hinged brake, there is a tendency for the brake to drag when released after wear has taken place, on account of the much greater motion and the consequent wear at the freely moving ends operated by the bell crank or cam. The band or ring also has this objectionable feature to some extent. The remedy for dragging in the clam-shell brake shoes is to cut away a considerable portion of the rubbing surface of the brake shoe near the pinned joint in that type. By suspending the band or jaws from the top by a somewhat loose connection, the dragging is somewhat lessened.



AIR PUMP ATTACHED TO NORTHERN VERTICAL MOTOR.

A type of expanding ring that has been adopted to some extent for friction clutches might also be applied to advantage in the expansion brake. It consists of a flexible ring supported in position by four short lugs extending from its inner surface in toward the center a short distance, and resting loosely on corresponding lugs of the rigid part of the frame. On account of being so supported, the band is entirely self-centering when applied by the motion of a cam which separates the ends in order to set it against the moving surface. In addition to entirely freeing itself, so as to have no drag when released, it also has the advantage of great simplicity, lightness and ease of replacement when worn out. The only adjustment for wear necessary is that

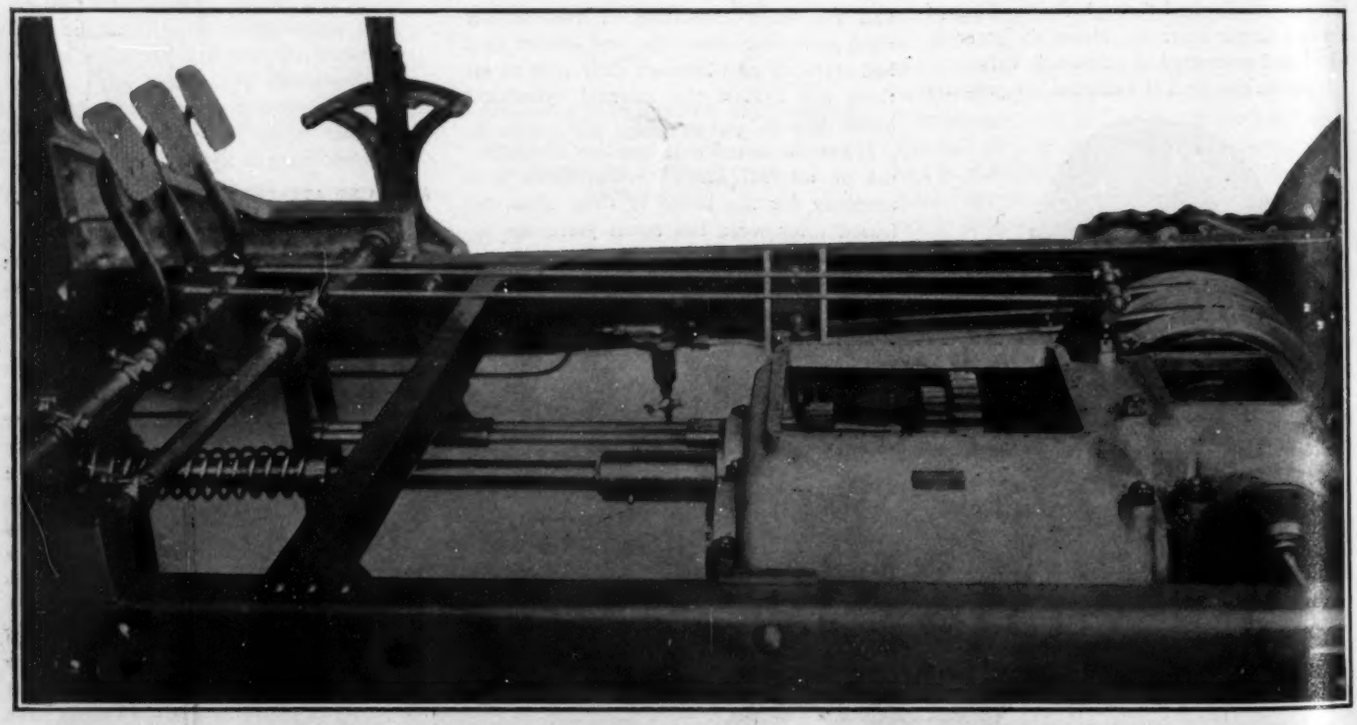


DOUBLE BRAKES ON REAR WHEELS OF PIERCE GREAT ARROW CAR. A TYPICAL EXAMPLE OF INTERNAL AND EXTERNAL EMERGENCY AND SERVICE HUB BRAKES.

of setting the lever rods so as to rotate the cam or pin connected bell crank a little farther to open the ring out wider as wear occurs.

Except in rare cases the emergency brakes are placed on the rear wheel hubs, and are operated by hand. In one design, however, the emergency brakes are foot operated, and in another they are on the countershaft. Except in one or two isolated cases, setting the emergency releases the clutch, the release taking place just before the brake begins to grip.

The importance of setting both emergency brakes with equal pressure has been quite generally recognized, and provided for by some sort of device for equalizing the force acting on them. In many cases an equalizing bar connected to the brakes has the pull from the lever applied at its center and distributed to the brakes from the ends. This equalizing bar in some cases extends across the entire width of the chassis and either rods or cables connect from each end to the corresponding brake. In other cases two bell cranks are used on the same rod extending across the frame, each with a crank arm from which a tension member extends back to the corresponding brake, and the inner ends which are brought near together are each provided with a crank. A short equalizing lever is placed between these two inner crank arms from



CHASSIS OF ROCHET-SCHNEIDER AT THE GARDEN SHOWING DOUBLE SERVICE BRAKES ON THE COUNTERSHAFT CONTROL PEDALS, AND CONNECTIONS. ONE PEDAL CONTROLS THE CLUTCH ONLY. ANOTHER PEDAL CONTROLS THE CLUTCH AND ONE BRAKE. THE THIRD PEDAL CONTROLS THE SECOND BRAKE ONLY

which the tension rod for setting both brakes connects to a crank on the hand operated shaft for applying the power.

Instead of this short equalizing bar, one chassis shows a modification in that particular part of the system by the introduction of the wire cable having the ends fastened to the two levers, and extending over a small pulley in a third lever or crank on the cross shaft which is operated by hand. This provision for the free motion of the cable over the pulley allows perfect equalization of pressure on the brakes.

is rather surprising to note that this method with short bends has been retained on some of the highest priced cars despite the objection just cited, and with the disadvantage of a lar less neat appearance than rods and equalizing bars. The fastenings of the cables are not neat and sharp ends are left projecting.

Those operating the emergency brake by a pedal claim that their object is to provide a method by which the clutch can be released and brakes applied with the greatest quickness, and that it can be done by the

ble attention. A small tank varying in size from one to three gallon capacity is attached to the car, sometimes high enough to allow water to flow by gravity upon the rotating part of the brake, but often placed low and compression used for driving the water out. This compression method is generally used in connection with the compression system of supplying gasoline from a tank below the frame of the machine in the rear. Either compression from the exhaust or by pump is used. Since but a slight amount of water is required for cooling the brakes,

GENERAL VIEW OF EXHIBIT OF FULL-SIZED APPARATUS, WORKING MODELS, DRAWINGS, AND PHOTOGRAPHS, MADE BY THE AERO CLUB OF AMERICA IN THE ARMORY SHOW.

The older method, so far as automobile practice is concerned, of securing partial equalization by running a cable from brake to brake through a hollow shaft with rounded inner corners at the ends and over a crank at each end with an easy curve, is still used to a considerable extent. While this allows fairly good equalization for light setting of the brakes, it will not equalize when the brake is set hard, on account of the friction of the cable in the bends at the ends of the tube and round the cranks. Especially when the bends are as short as on most cars. One or two have easy curves of long radius with correspondingly nearer approach to perfect equalization. It

foot quicker than by hand, especially as both hands are apt to be busy in cases when it is necessary to make a quick stop for safety.

The service brakes are most frequently of the band type placed either on the extension of the main shaft of the engine, the change-speed gear shaft, or the countershaft when the latter is used. One exception to this, however, has the emergency brakes on the counter shaft, and the service brake on the hub. Other and more numerous designs have both service and emergency brakes on the rear wheels, one external and the other internal.

Cooling the brakes has received considera-

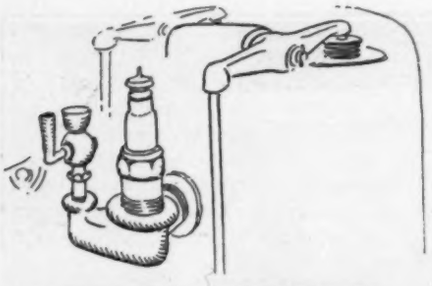
it is allowed to waste either by dripping to the road or becoming vaporized and passing away as steam. It is not applied to the rubbing surfaces since it would make the dripping power variable.

The few cars which have been heretofore using brakes for resisting action which would have to pass through a chain drive with the consequent loss of control of car with the breakage of a chain, have adopted the hub brake with its much higher element of safety.

The rubbing surfaces are ample in size for durability, this being especially desirable when wear and adjustment for allowing for it causes dragging of the brake.

IGNITION PRACTICE AT THE SHOWS.

AN examination of all the foreign cars exhibited at the Armory and Garden shows reveals the fact that only three of them are not equipped with some form of magneto ignition. One of



NORTHERN SPARK PLUG CHAMBER.

these latter is the Aster tri-car, which, however, really belongs to the motorcycle class; the other two are the Daimler and the Napier—both British. An equally significant fact is that each of these cars is equipped with a single coil and distributer.

This seemingly overwhelming indication of the popularity of the magneto abroad is not, however, as great as at first sight appears, since the exhibit is made up almost entirely of the touring car type of machine; there are no runabouts or light voiturettes of foreign manufacture in the entire show, nevertheless it is significant. In the matter of low- and high-tension magnetos, the former still seems to be the favorite, although the latter seems to be steadily gaining ground.

On the other hand, while comparatively few of the American cars are equipped with a magneto of any sort, yet the majority of those so equipped use the high tension variety. This is probably due to the fact that as the magneto is comparatively new, most manufacturers prefer to buy the entire apparatus which others have tried and found to be satisfactory, rather than to attempt costly experiments in devising a new type of low-tension make-and-break mechanism.

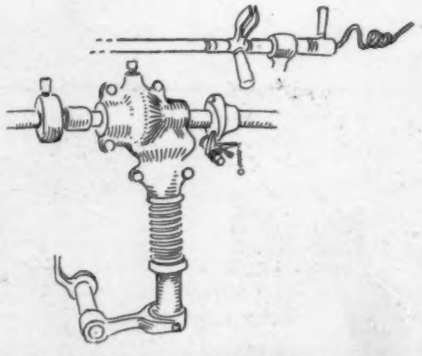
At present the individual coil system very largely predominates over all others in American practice—in fact, probably more than three-fourths of the cars at the two shows were so equipped.

There is, however, a considerable gain in the use of single coils and high-tension distributers, there being at least ten so equipped besides those makes which use small dry cells to energize the magneto coil for starting. A successful use of the distributer this year will probably mean its more general adoption another year.

In the matter of batteries the storage cell has increased enormously in popularity, and now at least three-fourths of American cars using battery ignition are so equipped, the use of dry batteries exclusively being confined to the light runabout type. Two sets of batteries are provided in almost all instances; some makers on the large and medium-priced cars provide two sets of storage cells; others one set of storage cells and one set of dry cells.

Coils are generally wound so as to be adapted for three-cell storage or four-cell dry, the reason given for this being that a four-cell dry, which is practically equivalent in voltage to a three-cell storage, has a lower discharge rate and is more economical to operate than a three-cell one, which is equivalent to a two-cell storage battery.

As it is not always easy in some localities to get a storage cell recharged, the



DETAIL OF BRASIER BEVEL GEAR DRIVEN IGNITION CAMSHAFT.

six-volt coil is much better in an emergency when it may become necessary to use dry batteries. Some American cars, however, which are equipped with foreign coils, are provided with two-cell storage batteries.

The vibrating type of circuit breaker and non-vibrating coil have all but disappeared except on motorcycles. The lever type of commutator is also disappearing. Commutators of the roller and ball contact type, together with the steel-faced revolving brush type, seem to be about equally popular.

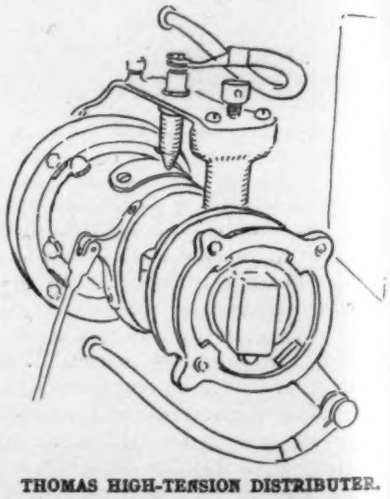
In the matter of the position and location of the spark plug or igniter—whether the low tension or high tension system is used—the practice on both foreign and American cars seems to be overwhelmingly in favor of placing them in the inlet valve pocket or near the inlet valve if the valves are placed in the head. It also seems to be a well-nigh universal practice to place high-tension spark plugs in a vertical position. The manufacturers of the Northern car have gone so far as to design an attachment which screws into the side of the cylinder to hold the plug upright. They claim for this device that it keeps the spark plug free from oil and adds to the power of the engine by accelerating the rate of flame propagation, for reasons which are outside the scope of this review.

The Mercedes employs a similar device, the electrodes being placed in a small pocket off the inlet valve chamber, which communicates with the chamber by a three-eighth-inch round hole. They claim for this device that it has the following advantages: First, it keeps out oil; second, it reduces the shock of the explosion and does not tend to loosen the plate on which the igniter electrodes are mounted, and third, it adds to the power of the motor by causing a much more sudden ignition of the main charge.

High-tension Magneto Ignition Systems.

High-tension magneto systems may be divided into two classes: The first class includes systems in which the magneto itself is really of the low-tension variety, but which energizes a separate induction coil, thus transforming the low-tension current of the magneto into a high-tension one. The coil, in most cases, is not fitted with a vibrator, but otherwise does not differ from the ordinary coil, with the exception that the primary is of higher resistance than that used on battery coils in order to be better adapted to the current generated by the magneto.

The second class may be called the true high-tension magneto. This class has a primary and secondary winding on the armature and delivers the high-tension current to the motor without the use of a coil. The



THOMAS HIGH-TENSION DISTRIBUTER.

Eiseman is probably the best-known example of the first class. The high-tension Simms-Bosch, of the second.

The Eiseman system is probably the best

known of all systems used in this country, being first introduced on the Panhard in 1903. The system is practically unchanged since then, although some improvements have been made in mechanical details. It is still in use by the Panhard company. The chief characteristic of this system is a normally closed circuit breaker, which keeps the armature grounded until the spark is to be produced, when this "ground" is broken, and the current flows through the induction coil. A distributor is made part of the magneto. The distributor, as on most high-tension magnetos, is mounted on the magneto base. The spark is advanced by means of a slotted sleeve device which alters the relation of the armature to its driving shaft or sprocket. On the Panhard a switch is provided so that batteries may be used for starting, the circuit breaker of the magneto and the magneto coil being used for this purpose. In one type of Panhard the magneto is mounted on a box on the dash and is chain driven, while in another it is mounted under the hood and is gear driven.

The Eiseman is also applied to the Packard car; in this case it is used in conjunction with a separate vibrator coil for starting, the timing of the battery coil being effected by an entirely separate commutator of the roller contact type. The magneto coil and battery coil are both placed in a box on the dash. A special switch is so arranged as to connect either secondary to the magneto distributor and also make the proper primary connections.

The Simms-Bosch. This is of the second class, having a primary and secondary winding on the armature (which is stationary), a revolving shield being employed as in the low tension type of this make. This magneto is used on the Renault, and the builders show their entire faith in it by discarding batteries, even for starting, and also by their method of driving it. The magneto is placed in front of the motor, with its shaft at right angles to the motor, and is driven from the cam-shaft by means of skew gearing. These gears are inclosed in an extension of the crankcase and the magneto is practically made an integral part of the motor. The sparking point is fixed, there being no provision made for altering it. Owing to the fact of this type of magneto having four maximum voltage points instead of two, the distributor is mounted at the other end of the magneto shaft at the left side of the motor, the magneto being almost directly in front.

The Simms-Bosch is also shown in use upon the Leon Bollee car; in this case, however, an individual coil and battery system is provided. These systems are entirely separate, two sets of plugs being provided, one perpendicular over the inlet valves, the other horizontal over them. Both systems of ignition in this case may be used simultaneously or either can be used separately.

This system is also applied to the C. G. V. in conjunction with an individual coil system. In this case, however, only one set of plugs is used, and a special switch is provided to change from one system to the other.

The Simms-Bosch company also makes a smaller type of high-tension magneto with revolving armature and separate distributor. One of these is shown applied to a Clement light car.

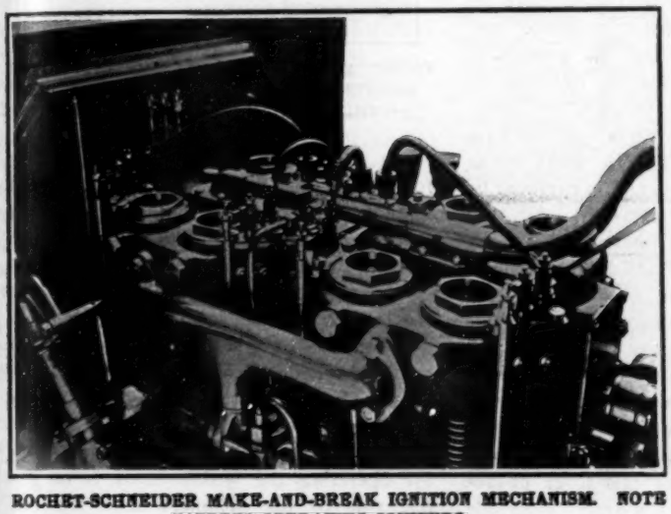
The Lacoste magneto is of the second class, with revolving armature. The special points of this apparatus are the excellence of the workmanship and finish, and the careful protection of all parts. It is provided with a very neat, entirely inclosed, slotted sleeve device for advancing the spark. This magneto has been applied by Smith & Mabley on their Simplex cars.

The Basse-Mitchell magneto, a comparatively new one to this country, is shown applied to the Decauville car. This system belongs to the first class, as it has a separate coil. The peculiarity of the system consists of the use of two primary windings to the coil, one for the magneto and the other for use in starting, with a two-cell storage battery. The system is very well thought out, and there are features in conjunction with the use of the two primaries which there is not the space to go into here. In the case of the Decauville, this system is used in conjunction with an individual coil system, there being in this case two sets of plugs, so the systems are entirely separate.

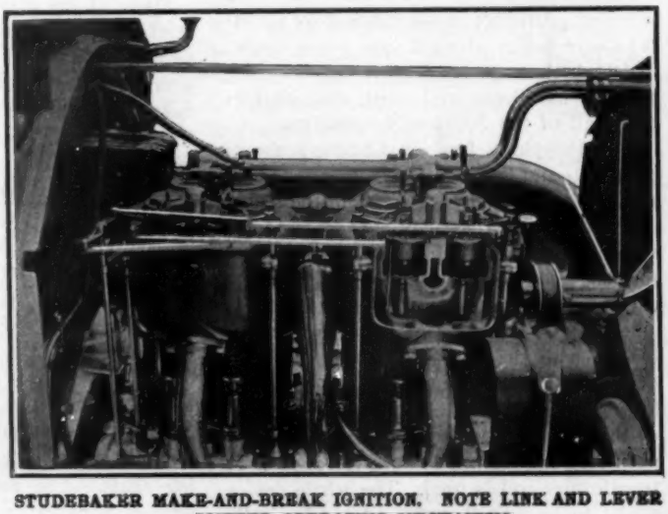
The Gianoli magneto system is shown on the De Leon car. This system employs a high-tension magneto of the second class, with primary and secondary winding. The spark is advanced or retarded by hand by shifting the pole pieces of the magnets. The great peculiarity of this system lies in the use of a magnetic circuit breaker instead of a mechanical one, as in most systems. This is mounted on the armature and is similar in action to the vibrator of a coil The advantages claimed for this device are: first, the circuit is always broken at slow speeds at the most advantageous point; second, at high speeds it acts as an automatic regulator and prevents burning out of the armature; third, the spark is automatically advanced. The system also includes a vibrator coil, a combined distributor and timer, which is not attached to the magneto, and a special switch for making the proper connections of magneto coil, distributor, the coil battery and switch being mounted in a box on the dash.

The Remy Electric Company shows its high-tension and low-tension magnetos. Its high- as well as its low-tension magnetos have been adopted by several well-known American makers. The features of this system are advancing the spark by shifting pole pieces, and general care in the design as to the protection of parts. A separate coil is used, this system being of the first class. Batteries may be used in conjunction with this coil for starting.

This magneto is shown applied to the Apperson Brothers car in conjunction with an entirely separate individual coil system, one set of plugs being placed over the inlet valves and the other over the exhaust. On all other makes, however, to which this sys-



ROCHET-SCHNEIDER MAKE-AND-BREAK IGNITION MECHANISM. NOTE TAPPETS OPERATING IGNITERS.



STUDEBAKER MAKE-AND-BREAK IGNITION. NOTE LINK AND LEVER IGNITER OPERATING MECHANISM.

tem is applied only four small dry cells are used for ease of starting.

The Holley magneto (Huff system), manufactured by the Holley Brothers, is distinctly original. It is of the first class and uses a separate coil, but in a rather peculiar manner. The magneto first charges a rather large condenser; connection with this condenser and the magnetos is then broken and, instantly following this break, connection is established between the coil and condenser, thus producing the spark by the condenser discharge through the coil. This system presents many interesting features, which it is impossible to go into in detail in this review. It is applied to the large Ford cars, it having been thoroughly tested by the Ford concern for upward of a year.

C. F. Splitdorf, maker of the coils bearing that name, has also placed on the market this year both a low- and a high-tension magneto. Both are of the revolving armature type, the high tension being of the second class with primary and secondary winding. Advance of the spark is by a slotted sleeve device which is very neatly made; in fact, both magnetos present the same mechanical excellence and finish that characterize all of the Splitdorf's apparatus.

The Polyphase Ignition Company shows both low- and high-tension magnetos, which are, perhaps, the most original in the show. The magnets are circular with pole pieces at opposite sides of the cylinder thus formed. The coils of wire in which the current is generated are placed on these pole pieces. The axis of the armature coincides with the axis of the magnet cylinder; it is of a peculiar reverse curved shape, having no wiring on it. The circuit breaker of the high-tension type runs in oil and is positively cam driven in both directions. A transformer coil is used. The whole device seems to be well thought out mechanically and is inclosed in a substantial aluminum case. Ring oilers are used; in fact, the circuit breaker runs in the oil well of one of the main bearings. This oil helps to "hill" the primary spark, thus augmenting the secondary spark.

Out of something like twenty machines, both foreign and American, exhibited at both New York shows, equipped with low-tension magnetos, it is rather remarkable that only one of these is fitted with any other system of ignition. This is an American machine—the Cooper-Hewitt—and is equipped with a single coil and distributer battery system of ignition.

The magnetos used may be divided into two classes, one which employs the revolving shuttle wound armature, and the other the Simms-Bosch type in which the shuttle wound armature is employed, but is held stationary and a shield is revolved to generate the electric current. This latter type has four maximum and minimum current points, and therefore need only be revolved at half the speed of the ordinary shuttle wound type with revolving armature. The Simms-Bosch seems to be rather the favorite.

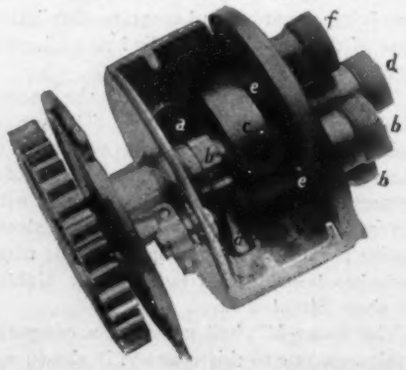
The shuttle wound types differ from each other only in minor details. It has become the general practice to connect the magneto with its driving shaft by means of a jaw clutch or some form of coupling, so that if removed for inspection or repair the magneto can be readily replaced "in phase," that is with its armature in correct relation to the igniter positions.

Most of the older builders, such as the Mercedes, Fiat and Mors, place their igniters in a pocket at the side of the inlet valves. These makers generally operate the moving electrodes by means of vertical reciprocating rods which rise up from the camshaft casing. The advance is secured in various ways: The operating lever attached to the rod is moved across the face of the cam, the operating cam is moved longitudinally, or the camshaft itself is moved bodily.

Many of the makers who have more recently adopted low-tension magneto system, have adopted a form of ignition in which the two electrodes are mounted on one of the valve covers (usually the inlet). In this case the mechanism is operated by a lever on the end of a rock shaft which rises from the crankcase, and is operated by a face cam on the valve camshaft. Advance is secured by raising or lowering this vertical shaft. The Martini and Rochet-Schneider employ this type of mechanism.

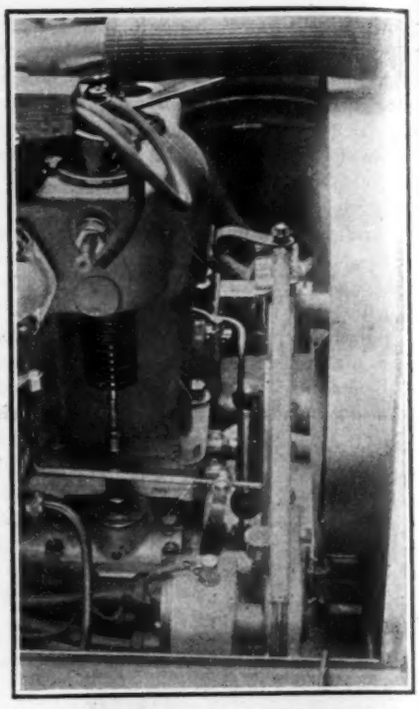
An ingenious modification of this device is employed on the Rainier and Studebaker cars. The vertical shaft revolves and carries a push lever which fulcrums on a movable fulcrum and which is operated by a crank on a disk on top of the revolving shaft. The end of this lever pushes against a pallet on the movable electrode which is connected to the stationary electrode by a spring so as to allow movement of the pallet after the electrodes are in contact.

It will be seen that as the lever moves



SMITH & MABLEY COMBINED DISTRIBUTER AND TIMER WITH CASE PARTLY REMOVED.

a a, woven wire brushes for primary current; b, brass and fiber disk of timer; c, fiber disk of secondary distributer; d, hard rubber bushing for high-tension leading-in wire; e e, distributing points for secondary current; f, bushings leading out spark plug wires.



FRONT END OF S. & M. SIMPLEX MOTOR SHOWING LOCATION OF COMBINED DISTRIBUTER AND TIMER AND WIRE CONNECTIONS TO PLUGS.

forward against the pallet, it will also tend to move outwardly so that it will slip off the end of the pallet. The point at which this will occur depends upon the position of the movable fulcrum and this position is altered by the spark advance lever.

The action of this device is very similar to the mechanism of the Brasier car of 1904. The Brasier car has been radically changed as regards the igniter mechanism on the 1906 models. A camshaft solely for operating the igniter cams is on the left side of the cylinders near the top. Face cams on this shaft operate the igniters by direct contact. This camshaft is driven by means of a bevel gear on a vertical shaft, which rises from the center of the crank case on the left side. The change from starting to running position is made by a slotted sleeve which connects the two halves of this shaft. The lever which operates this is connected with the device which throws the compression relief cams into action to render starting easy. Brazier still holds to his policy of fixed running point for the spark without any adjustment being permissible while driving.

For various reasons the amount of dvance required with low tension spark is much less than with the high tension system; many makers have therefore discarded all mechanism for advancing the spark, as, for instance, Duryea and Mors. Others like Brazier have simply a running and starting position; while still others, as the Fiat and De Dietrich have adopted an automatic advance mechanism. With the high tension system, on the other hand, only two exam-

ples are shown of automatic spark advance; one of these on the four-cylinder Cadillac is supplemented by hand regulation. The other was used in the 1905 model Rambler, and has been discarded on the 1906 four-cylinder model.

The electrical connection between the magneto and the igniters is in most cases of the simplest possible kind; a wire leads from the magneto to a bus bar and from thence it is led through cut-out devices to each igniter. These cut-out devices are used to test the action of each cylinder by suppressing their ignition in turn. In many cases—the Mercedes for example—no method is provided for cutting out the ignition when driving, in case it is necessary to stop the motor, the throttle alone being used. In cases where such a device is provided, it is of the simplest possible description. For instance, in the case of the Fiat, there is on the dashboard simply a brass knob which is grounded, and which, when pressed in about one-fourth, touches the end of the bus bar, thus grounding the current and cutting off the ignition.

While on the subject of low tension ignition, it might be well to mention the Carou system. This system employs so-called magnetic plugs which screw into the ordinary high tension spark plug holes. The energy is supplied by a special type of magneto which is provided with a commutator that distributes the current to the plugs. The action is as follows: When the current flows through the plug, it energizes a solenoid which withdraws an insulated electrode from the ground inside the center, thus causing a spark to be formed.

This system is fitted to the Aster car in addition to a high tension individual coil system.

SECONDARY DISTRIBUTORS AND INTERRUPTERS.

The practice of using a single coil and distributor, while not as yet common on American cars, does not seem to be losing ground. The Napier Company, which was the first to make a practical success of this method of ignition, is still using it, and the timer and distributor are practically identical with the first models. The distributor and timer, together with the coil, are mounted in a box on the dash and are chain driven. Timing is effected by rocking the brush-holder of the timer and collector points of the distributor about the axis of their respective shafts. The collector points, however, are connected to the secondary leads by a system of brushes, so that there are no moving secondary wires. The timer of this device is of the simplest possible description, consisting of a four-toothed cam-wheel of about 1-2-inch face and 2 inches in diameter and a strip of copper of about equal width, which serves as the brush for the insulated electrode. On the latest 60-horsepower Napier the chain drive to the distributor has been abandoned, and instead a vertical shaft and bevel gear, together with slotted sleeve advance, are used.

The English Daimler also uses a secondary distributor. In this case the shaft is vertical and the distributor is about on a level with the tops of the cylinder heads and toward the front.

The Thomas Flyer was one of the first American cars to use the high-tension distributor. The builders are employing a very neat one of their own manufacture. It is mounted on the dash and has a collector ring around the main part of the distributor so arranged that the secondary wires do not move. It is driven off the camshaft by means of a vertical and horizontal shaft and bevel gears.

Smith & Mabley also use a distributor. This is placed at the end of a shaft and the secondary cable from the coil enters at the center of the cover. It leads to a radial arm on a thick, hard rubber disk. Points placed in this cover collect the current for their respective plugs from the arm on the face of the disk. The current is led by cables from the points to the respective plugs by cables which pass through bushings whose axes are parallel to that of the axis of the distributor. The timer part of this apparatus is of the woven-wire brush type, with brass contacts and fiber bearing surfaces.

Grout Brothers exhibit a distributor on their car, as also do the makers of the Compound car. In both these cases the Altemus distributor is used. In the case of the Grout car advance of the spark is secured by a slotted-sleeve device. Both makers, however, place their distributors at the end of vertical shafts, well toward the top of the bonnet. This is probably to keep the distributor free from oil or dirt that might tend to cause a short circuit.

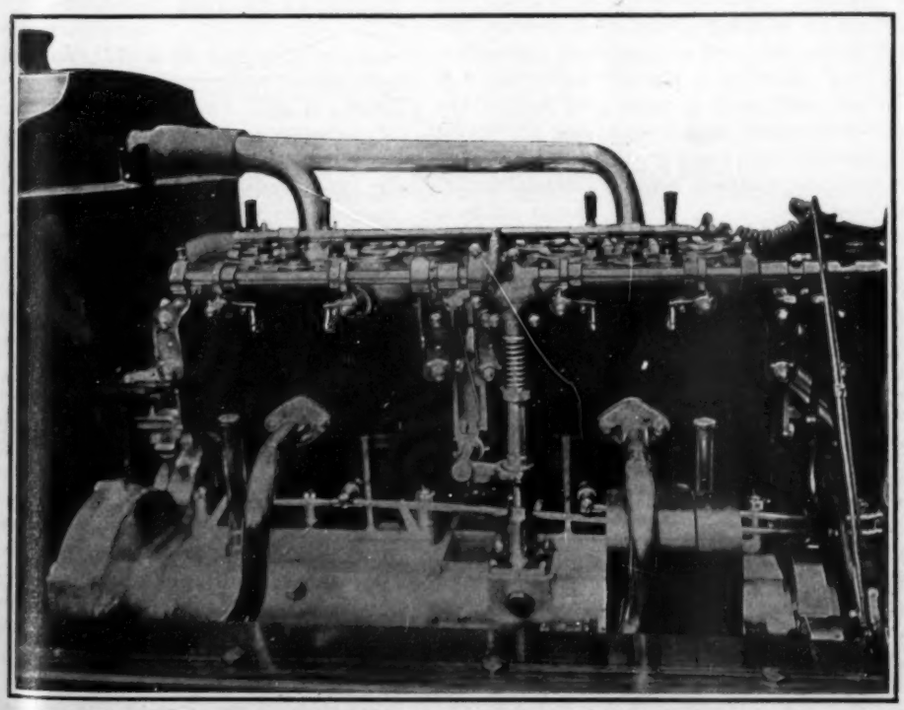
A form of distributor is fitted to the Pullman car, which, to say the least, has the advantage of novelty to recommend it. A shaft extends out longitudinally over the top of the cylinders; this shaft has arms on it, which come into contact successively with light brass strips attached directly to the spark plugs.

The Atwater Kent spark generator is quite an interesting device. It consists of the combination of a distributor, a new vibrator coil and a novel form of circuit closer and breaker. This is so arranged that there is a snap-off action, so that no matter how slow the engine may be running the duration of the contact is always the same and the break is quick and sharp. Furthermore, it is impossible to leave the motor in such a position as to short circuit the battery. The makers of this device claim that it will lead to great battery economy. The mechanism is quite simple, but for want of space a more detailed description must be omitted.

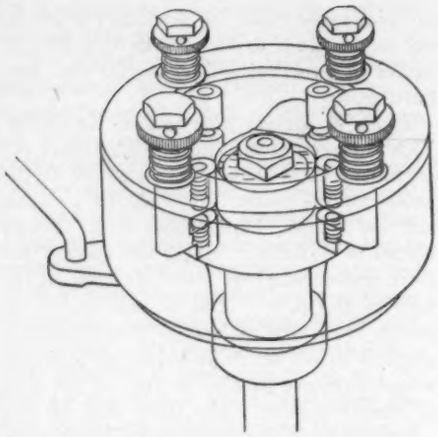
It is hard to say what form of interrupter is most popular. The general principles employed are steel against steel, spring actuated, movable brush, movable brush with stationary ball contacts, and roller contacts of one kind or another. All seem to give reasonably good service and wear well if properly made.

The Uncas Specialty Company, in order to show the adverse conditions under which their timer would work, had two of them running continually during the show, completely submerged, one in a bath of oil and the other in a bath of water.

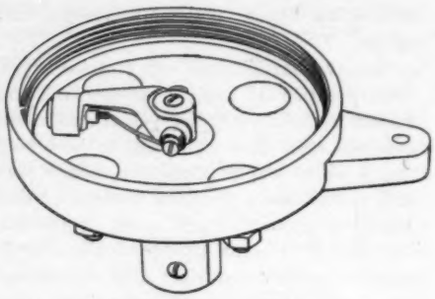
Mosler showed a rather interesting modi-Crouse-Hinds double-ball interrupter. In this case a roller is mounted on a crankpin



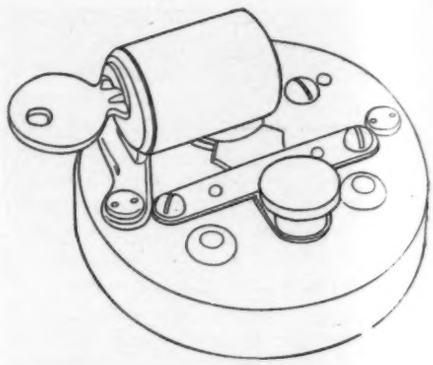
BRASIER MAKE-AND-BREAK IGNITION SYSTEM. NOTE IGNITION CAMSHAFT NEAR TOPS OF CYLINDERS OPERATING IGNITERS BY FACE CAMS



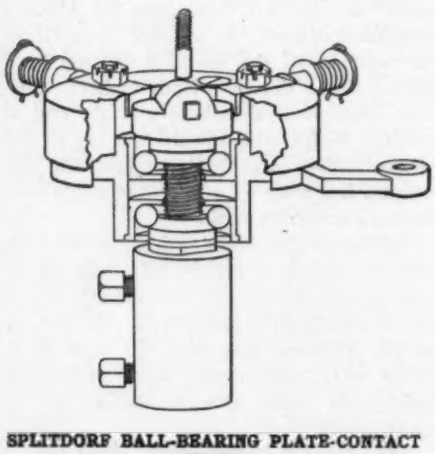
CROUSE-HINDS DOUBLE BALL CONTACT TIMER.



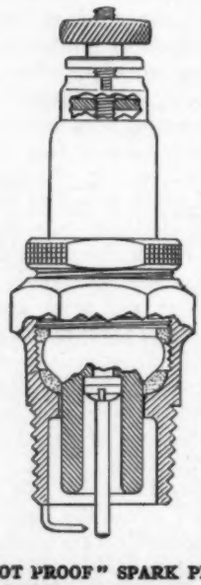
DODGE WIPING CONTACT TIMER.



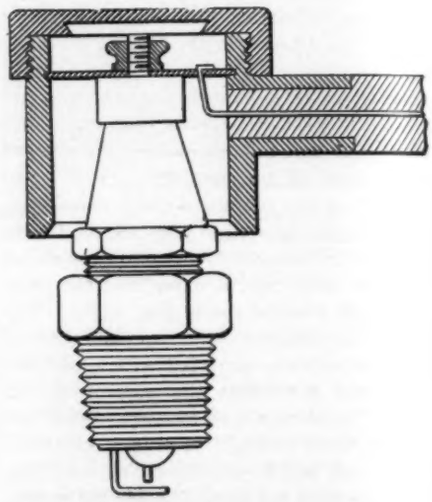
AUTO LOCK PLUG APPLIED TO TWO-WAY SWITCH.



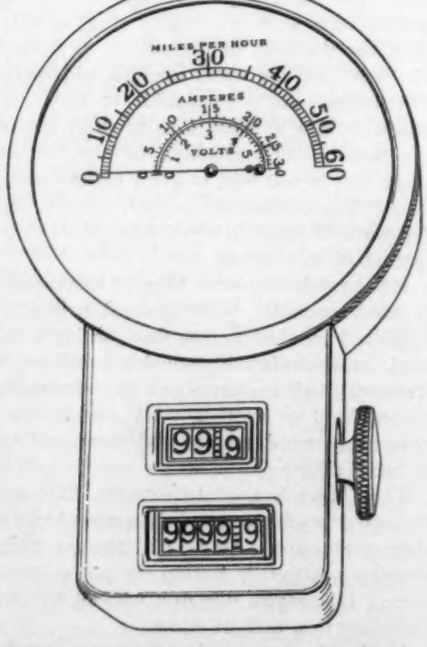
SPLITDORF BALL-BEARING PLATE-CONTACT TIMER.



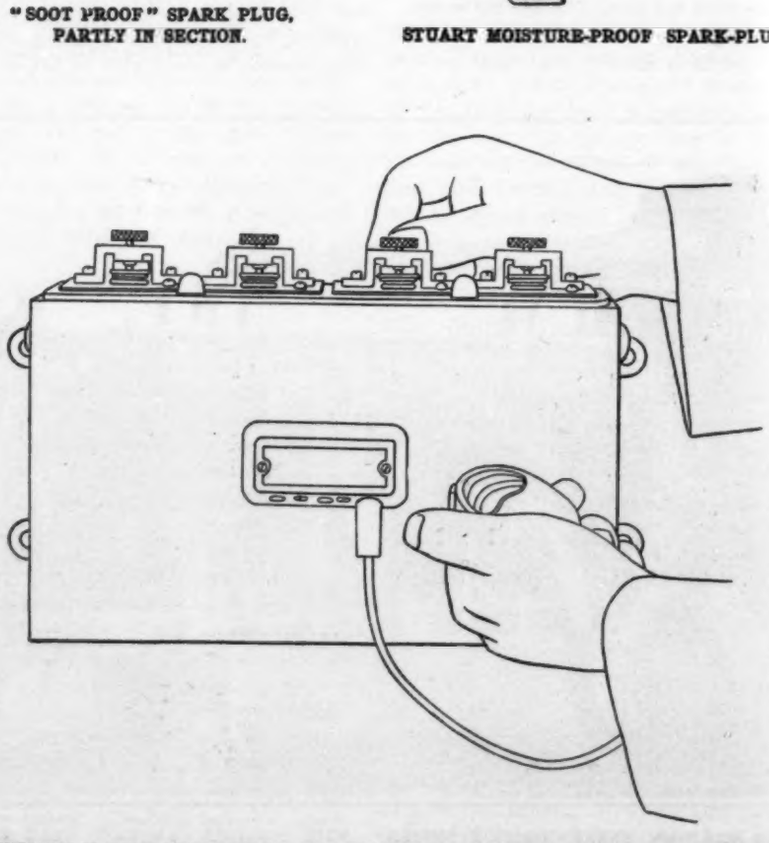
"SOOT PROOF" SPARK PLUG, PARTLY IN SECTION.



STUART MOISTURE-PROOF SPARK-PLUG HAT



LIPMAN COMBINED ELECTRIC SPEED INDICATOR, ODOMETER AND BATTERY TESTER.



CONNECTICUT INDICATING METER FOR MEASURING CURRENT PASSING THROUGH COIL.

with a rather short throw. The current is led to the roller by brushes let into the casing of the device; these are of hardened steel and cushioned by a spring. The roller is about 1 1-4 inches in diameter and the throw of the crank about 1 inch.

Perhaps one of the most novel is the Crouse-Hinds double ball interrupter. In this device at each brush or point two balls are placed with their common axis parallel to the axis of the interrupter; they are held in contact by springs, which are also parallel to the axis of the interrupter. The revolving member is a knife-shaped steel blade, which passes between and separates these balls. To all intents and purposes this is a revolving knife-blade switch. Great claims are made for it on the score of durability, and it would seem likely that these would be borne out in practice.

Coils, Instruments, etc.

In the matter of coils no very startling innovations have appeared at the New York shows. The unit system of construction is now universal in the best American makes. In some cases the coils may be removed from the coil box without disconnecting a single wire, connection being made by springs or contacts on the sides and bottom of the coil box. One maker fits his box with space for an extra unit so that a spare coil is always on hand in case of accident.

The hammer-break type of vibrator seems to be most in favor. Most manufacturers are now working toward producing economical and efficient coils and are doing their best to educate the public in the proper use of them by distributing really helpful handbooks of one kind or another.

In the line of testing instruments, ammeters and voltmeters there are no specially new developments.

The Conn. Tel. & El. Company, however, have produced an instrument which they call a "coil current tester." This is nothing more or less than an ammeter which can be connected in series with the coils when the motor is running, and this enables the operator to measure the current consumption.

Another ingenious idea is the Lipman speed indicator. It is principally a device for measuring the speed of a machine, and consists of a small alternating current generator mounted on the steering knuckle of the front wheel, connected with a voltmeter mounted on the dash, the meter being graduated in miles per hour. There is, however, another scale on the instrument, and by means of a cord, which can be plugged to the instrument, one can readily measure the voltage or the amperage of the batteries, as the case may be.

In the matter of spark plugs, the soot-proof type, with long tapering insulation protected by the casing of the plug, seems to be the prevailing type. Porcelain seems to be still in the lead, but mica seems to be gaining in popularity as the insulating material of the plug. The general tendency in the improvement of plugs is toward refinement of detail, such as the use of paper-asbestos copper gaskets instead of asbestos string packing.

A novelty in the plug line was the plug exhibited by the Duplex Ignition Company. This, to all appearances, was an ordinary plug with the exception that a wire projected through the insulated terminal and terminated in a small, hard rubber rod above this. Upon dipping a piece of string into water and tying it around the spark points, for trial purposes, the plug was completely short circuited; however, on withdrawing the wire about half an inch the spark jumped the gap as readily as ever.

In the matter of dry batteries perhaps the most notable novelty was the Columbia reserve dry cell. This cell is so constructed that it may remain unused any length of time under reasonable conditions and will not deteriorate. It is, however, necessary to add water to render the cell active.

In the matter of storage cells the same finality seems, for the present, to have been reached and makers are striving to turn out a good serviceable article.

Most of the makers are supplying a simple charging set consisting of a cluster lamp holder for three lamps, at a nominal price, and invariably they supply handy little instruction books on the care of batteries.

In small fittings a number of minor novelties were shown, such as clips and connectors for batteries, and snap connections of one sort and another for quickly connecting or disconnecting plugs. A device shown by various makers under different names, such as "hat" and "protector," consisted of caps which fitted over the spark plug to protect it from rain, spray, or other moisture. These are, perhaps, more useful for marine and motorcycle work than for the automobile.

Dashboard switches were shown in endless variety. The detachable lever type seems to be gaining somewhat in favor. Rubay showed a Lacoste high-tension switch for changing over from magneto to battery ignition. Several so-called "lock switches" were shown fitted with Yale keys, so that they could not be tampered with when locked with the ignition circuit opened.

New Ideas in Tires and Wheel Rims.

IN tires, the same as in every other branch of the automobile industry, the last twelve months have seen great advances made, and these were manifested in the interesting exhibits of the tire manufacturers at both the Madison Square Garden and Armory shows. To the visitor making a round of the various booths it was evident that, now that the manufacturers have been successful in making a tire that will "stay put" on the wheel and give reasonable service, they have practically united in diverting their energies from the pursuit of a puncture-proof rubber-and-fabric tire, and instead have devoted their efforts to simplifying and improving the construction of rims in order to facilitate the removal and replacement of tires when the possible puncture occurs.

Really, it was not the fact that a tire deflated when punctured and had to be repumped that harassed the ordinary motorist, but the knowledge that in case of mishap he had ahead of him half an hour's hard labor in a fight with lugs and to get the bead of the tire out of the rim channel with scarified hands and inadequate tools. And then when the old tube was out and a new one in its place, there was the ever-present danger of pinching the tube when the tire was forced back into place again. Many an automobilist has perspired in getting tube and shoe on the rim, lost his wind in pumping up the tire, and finally tightened up his lugs, only to ride a block or two and have the thing go flat again with a pinched tube.

Realizing that the puncture bugaboo was driving many automobile users to pedestrianism, and still others to the use of solid and semi-solid tires, the manufacturers of pneumatic tires set about to devise a quickly detachable rim that would at once be inexpensive to manufacture and attractive to the user as a time saver. The result is that several of these new rims are now offered to the public and are meeting with ready sale. Many drivers believe that they will do more toward popularizing the use of automobiles than any one other thing, because they will give to the users a sense of comfort and a freedom from the dread of punctures that will be at once pleasing and encouraging.

The manufacturers of solids, in the mean time, have given some attention to pneumatic tires. The Firestone people show a new line, and the Swinehart company manufactures a single tube tire which is practically an enlargement of the single-tube bicycle tire, so constructed that it may be run flat without rim cutting. This result is obtained by placing the entire air chamber above the rim, and in case of puncture the tire is repaired with a large rubber plug which is cemented in place.

In tire sections the American manufacturers have followed the lead of the foreign makers and are now turning out numbers of flat tread tires. The advantages claimed for these are that the tread, being heavier, resists punctures and road bruises better than the old type round tread, and that the tire, by reason of the wide flat tread, secures better traction and wears more evenly.

Tire protectors galore appear at the various booths, many new and original ideas being shown. A favorite type is a new cover made after the pattern of a

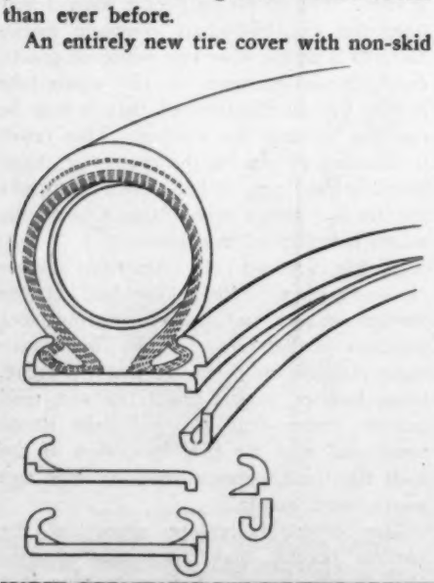
complete tire which is turned out in a size slightly smaller than the tire it is to go over. The tire to be covered is deflated. The cover is placed over it and when the air is pumped in again the cover is held firmly in place without any clamps or other fastenings.

Non-skid treads and devices of all sorts numerously appear and almost every manufacturer of tires has a new type to show. It is evident that this most important question of skidding has been given the thought and attention that it deserves, and the result is the appearance of a number of simple and apparently efficient devices. The Bailey non-skid tread is a leader among these, and there is no end of others which are claimed to be equally as desirable and efficient. The tire manufacturers have at last realized that something must be done to prevent skidding if the auto is to be an all-the-year-around machine.

A tire made completely of leather, with the exception of the inner tube and fitted with non-skid pegs, was one of the newest show features. The manufacturers guarantee this for a year against rim cutting or blow outs.

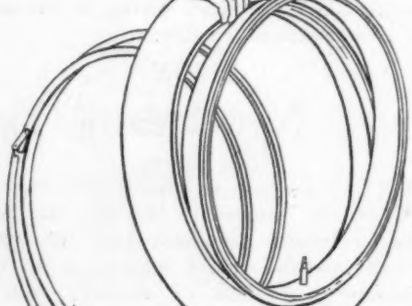
All along the line the manufacturers have increased the weight of tires and are seemingly using greater care in the selection of materials. The buyer in 1906 will not only have a greater selection to choose from, but he will receive the greatest value for his money that tire manufacturers have ever offered. If he so desires he may have his car equipped with a set of tire covers to go over the new tires and by this means may run indefinitely without even allowing his tires to once touch the road. First cost has not been reduced. In fact in many cases it has been increased, but the purchaser gets better material, better design, and will surely get better service. With the tire troubles minimized, if not eliminated, automobiling will indeed possess charms of greater attractiveness than ever before.

An entirely new tire cover with non-skid



MARSH DETACHABLE RIM SHOWING DETAILS AND RING SECTIONS.

device was shown by the Diamond Rubber Co. It is known as the Burnham protector and is made in the ordinary wrapped tread, Bailey tread, special bar tread, or with the leather and steel stud tread. These covers are slightly larger than the tire they protect and are placed on when the tire is deflated and as it fills out are held in place by the pressure against them. The protectors have been tested out in the West and are shown for the first time in New York. The company did not decide to exhibit until the last moment and had no printed matter descriptive of its product to offer. The Diamond people, besides their regular line of tires, displayed several types of side-wire solid tires for commercial vehicles. They also exhibited and demonstrated the Marsh rim, which is one of the many quickly de-



COMPONENTS OF MARSH DETACHABLE RIM.

tachable rims shown. It may be adapted to any wheel and it is claimed reduces the time necessary to get an inner tube out to one minute. It is impossible for the tire to creep or to be dragged from the rim. Neither will it "rim cut" if run flat after a puncture. The accompanying sketches give an idea of the design and method of using the rim.

The new diaphragm tube is a 1906 product of merit and originality. It is in reality two inner tubes in one with valves placed at either side of the wheel. When one tube is inflated the other is pushed up out of the way so that it cannot be pinched. In case of a puncture the nail or other foreign matter is removed and the second inner tube is blown up, it being intact. The car may then proceed without the delay of removing the shoe to replace the inner tube. The Goodyear Tire & Rubber Co. showed a full line of wrapped tread, pneumatic tires for automobile use. The Goodyear detachable tire and Universal rim are specialized. This new rim consists of a single flat steel band rolled to shape and adapted to fit any wheel with a wooden felloe carrying standard clincher tires; two removable (endless) steel flange rings, adapted in contour on one side to engage

GOODYEAR CORRUGATED TREAD SOLID RUBBER TIRE, ON GOODYEAR DETACHABLE RIM.

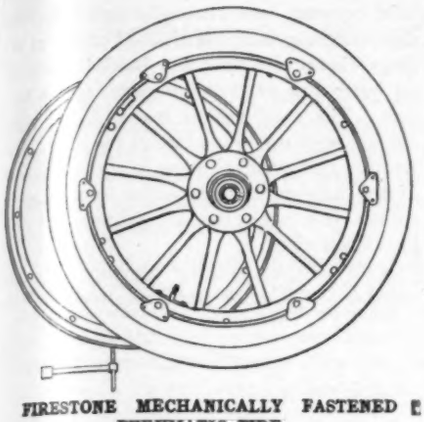
the ordinary clincher type of tire, and on the reverse side for the improved Goodyear detachable tire; and an open steel locking ring which locks the flanges in position; the whole rendered rustproof by galvanization.

The new endless solid tire with escalloped tread was shown and claims made that it is possessed of considerable resilience. The escalloped tread, it is pointed out, allows expansion in four directions, absorbing a considerable part of the road jar. The tire is recommended for commercial vehicles.

This company is particularly enthusiastic over the new Heine non-skid tread car, which came out only a few days before the opening of the show and was offered on the market for the first time. The feature of the tire is claimed to be the fact that it is an absolute non-skid tire and the only one so devised that it does not detract from the resiliency of the tire, but in fact adds to it. The tire is of the usual construction with the exception of the tread, in the center of which are small steel caps sunk in round depressions at regular intervals around the periphery of the tire. These steel bolts grip on muddy asphalt or hard roads and prevent skidding, and it is further claimed that on clay or mud roads additional traction is secured through the suction of the circular depressions in the tread of the tire, in the center of which the steel non-skid pegs are found. These pegs as worn out may be replaced either singly or in strips of a half dozen or more.

The well-known tires of the B. F. Goodrich Co., with tough Goodrich tread and integral construction, were exhibited in all sizes and with the usual non-skid treads. Also a line of tires for commercial vehicles known as the "Goodrich endless side-wire motor tires." The Goodrich quick detachable tire and rim also attracted visitors. It has already been illustrated and described in these columns. It has all the desirable qualities of other rims in preventing creeping or rim cutting, pinching of the tire and in enabling a tire to be promptly and easily removed.

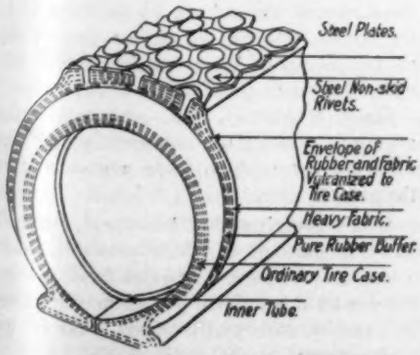
The specialty of the Hartford one-vulcanization wrapped tread tire fitted to the Hartford Universal rim was demonstrated by the Hartford Rubber Works Co. Its most novel and practical feature is the



FIRESTONE MECHANICALLY FASTENED PNEUMATIC TIRE.

floating ring, an endless band made of light metal heavily coated with zinc to prevent rusting. This band has sufficient allowance over the diameter of the rim at the tire seat to insure ease in placing the tire and floating ring on the rim in one operation, the ring being practically part of the tire. When the tire is in place its inside edges bear against the outside edges of the floating ring. Then, when the metal bead is drawn down into the gutter by means of the turnbuckle, it wedges against the outer wall of the casing and prevents water entering the tire. In addition to sealing the tire, this floating ring is in effect an endless lug. It is claimed that a tire may be ridden flat for miles and will not rim cut. The rim is fastened with the usual turnbuckle. It is reversible, so that either the Hartford Dunlop or any clincher tire may be used.

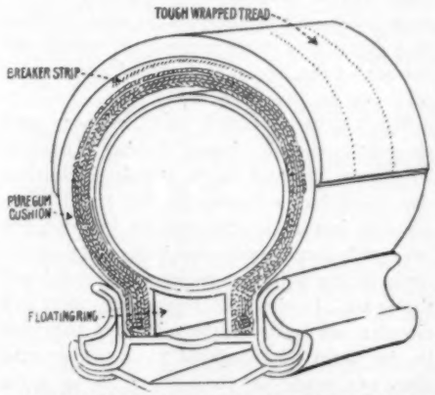
The H. & F. Mesinger Co. exhibited the Mesinger pneumatic leather tire, which is guaranteed for six months against rim cuts or blow outs. This tire is a new departure and is constructed entirely of heavy oil-finished, chrome-tanned leather, which is exceedingly tough and pliable. Absolutely no rubber or fabric is used. The different layers are cemented together with waterproof cement. The tread is formed of leather disks cut from heavy stock. Each disk is fastened with three screws of special design, which are screwed with cement into the solid leather and can be renewed when worn. A specially constructed rim is furnished with this tire which fastens the tire to the rim by a steel band that is contracted or expanded by the movement of one nut with the toggle spanner.



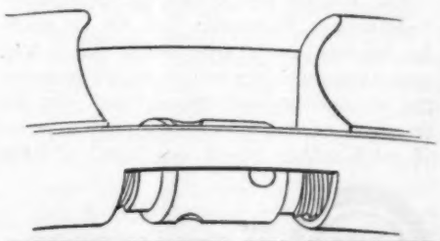
POST "COAT OF MAIL" TIRE.

A tire protector which is original, inasmuch as no leather is used in its makeup, was shown by the Post Manufacturing Co. This protector is known as the "Coat of Mail," and is an envelope of rubber fabric and small steel plates that fits around the tire like a glove and is vulcanized in position. It is claimed to be absolutely unpuncturable and non-skidding.

Wrapped tread clincher tires in all sizes were shown by the Pennsylvania Rubber Co. This concern does not use quick detachable rims, and claims that the bead of its tire is so constructed that the danger of rim cutting is reduced to a minimum. There was also shown a new flat tread racing type with non-skidding properties—the latest product. It is patterned after the flat tread tires used so extensively



HARTFORD ONE CURE DUNLOP TIRE.

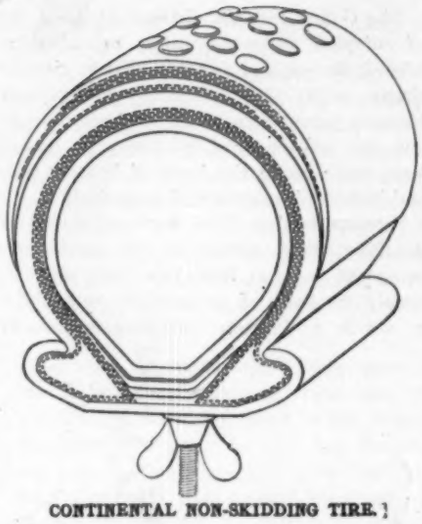


HARTFORD RETAINING RING TURNBUCKLE.

abroad. There is a 3-inch tread which, it is claimed, will act as a great preventative of skidding, even after the corrugations are worn down on the tire.

Morgan & Wright exhibited tires for every sort of automobile use. They maintain that their tires are not only of wrapped tread construction, but are wrapped tires wholly cured in open steam, a process which prevents the wrinkling of the fabric with consequent troubles. This maker also furnishes the Bailey non-slip tread as the non-skidding specialty. The Morgan & Wright Dunlop was also shown with special quick detachable rim of the concern's own make. Apart from a general strengthening of their tires and the continued use of the high-priced materials, they have not departed from the 1905 types.

Fisk mechanically fastened tires in all sizes were shown by the Fisk Rubber Co. This tire is bolted and clamped to a flat rim so that "rolling" or "creeping" is obviated. All the air space is above the rim, and the

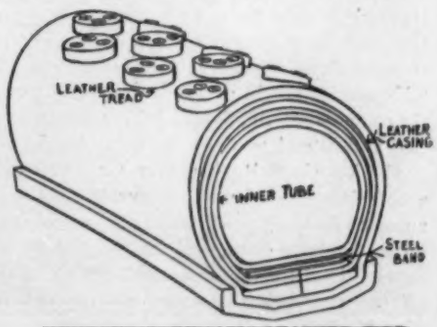


CONTINENTAL NON-SKIDDING TIRE.

tire is guaranteed against rim cutting. Neither can it fly from the wheel when either inflated or deflated. It is also impossible to pinch or injure the inner tube after a puncture has occurred. The tire was shown with the Bailey non-skid tread as well as the standard Fisk treads.

The Firestone Tire & Rubber Co. presented an innovation in the way of a pneumatic tire which is likely to be popular. It is known as the Firestone mechanically fastened pneumatic tire. It is built up with successive layers of fabric and rubber. A wire cable is inserted in each edge of the tire and the layers of fabric pass around these cables, which insures the holding of the tire rigidly in place. Non-corrosive clips are riveted to the tire at regular intervals, with rivets which have large, smooth heads. The felloe bolts pass through these clips as well as the felloe and side flanges, insuring rigidity when the tire is in place. The tire cannot creep or rim cut. The illustration shows the rim removed.

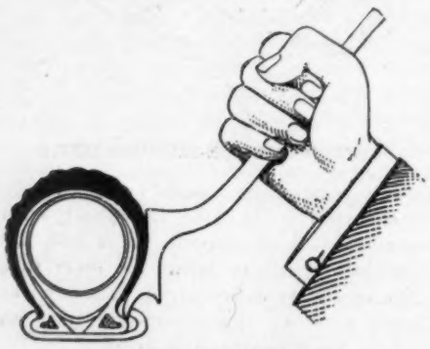
The Continental Caoutchouc Co., importers of the "Continental" German tires, claimed the distinction of having the greatest number of sets of tires on cars on view at the two shows of any tire concern exhibiting. A large variety of sizes was displayed, including the original flat tread racing tire. A new steel studded non-skidding tire was shown and recommended for city use on slippery pavements and for general winter use. It is of original design, with steel studs set in the tire tread, as shown in the accompanying illustration.



MESINGER PNEUMATIC LEATHER TIRE.

The G & J Tire Co. showed its usual line of complete tires and parts, and also exhibited the regular tire moulded in circular shape with the non-skid corrugations. Nothing particularly novel has been brought out, the advancement of the year having been made along the lines of heavier tires and improved processes of manufacture.

Samson leather tires were exhibited by the New York agents in two styles, one being the familiar light type tire, which is simply the body of an ordinary rubber tire to which a Samson leather protector or



LARGE G & J TIRE TOOL.

tread has been applied. The other is the new "Type Course" tire, which is claimed to be the strongest in the world. It is warranted not to affect the resiliency of the tire and, besides preventing skidding, is practically puncture proof.

The International A. & V. Tire Co. showed the Fox brand tires and inner tubes in all sizes. In International tires the fabric is coated both sides with pure Para cement and the layers of fabric separated by pure gum, so that one ply of fabric cannot rest on the others. This internal cushioned construction is claimed as an exclusive feature, and has been successfully used for years.

The Swinehart Clincher Tire & Rubber Co. exhibited many standard styles and sizes of solid tires for pleasure and commercial vehicle use. The company claims a record of 2,000 sets of solid tires for last year, which it hopes to exceed in 1906. This manufacturer is getting out an entirely new pneumatic tire which will be a huge edition of the old single-tube bicycle tire. The entire air space will be above the rim and the tire may be run deflated without rim cutting. When punctured a large rubber plug will be used to repair it, much the same as the old bicycle tires were repaired. This tire will soon be on the market, and although the Swinehart company does not advocate its use in preference to solid tires, they appreciate the demand for a pneumatic tire and intend to meet it.

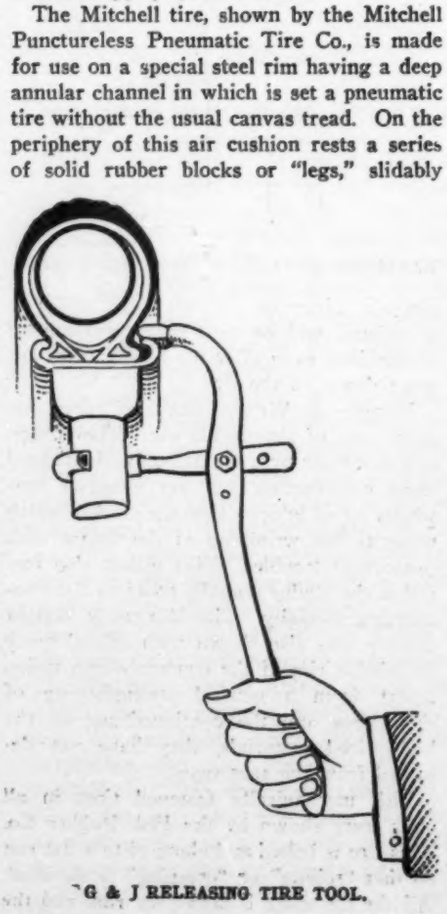
The Voorhees Rubber Mfg. Co. exhibited a complete line of non-puncturable cushion automobile tires, made after the same patterns that have been used for the past three years. The tire is guaranteed not to come off the rim, being fastened with a patent wire binding.

TREAD OF S & M HERCULES TIRE.

An interesting display of the Hercules anti-skid tires was made by Smith & Mabley. This tire is designed to prevent punctures, blow-outs and skidding, and is withal resilient. Rubber is used as a basis for the tire, and several thicknesses of tough linen fiber are used, being moulded directly into the rubber. Attached to the shoe and forming the tread is a strip of rawhide varying in width in accordance with the size of the tire. On this strip of rawhide stand two or four rows of pyramidal projections of specially hardened steel. Each pyramid is made of a single piece of steel, including the shank, which penetrates the strip of rawhide and is fastened inside of the rubber shoe itself. By this means, so long as there is a particle of steel projecting beyond the surface of the tire, it is fastened as securely as it was in the first place.

Solid tires moulded from rubber were shown by the St. Johns Rubber Tire Co. These are formed to fit standard clincher tire rims, but with nearly flat tread. The cushion feature is obtained by forming the tires with large transverse holes passing entirely through the tire between the tread and the beads. In the auto tires these holes are circular, while in the bicycle tires they are in the form of elongated slots. The auto tires are made in sizes from 28 by 2 1-2 inches to 34 by 4 1-2 inches.

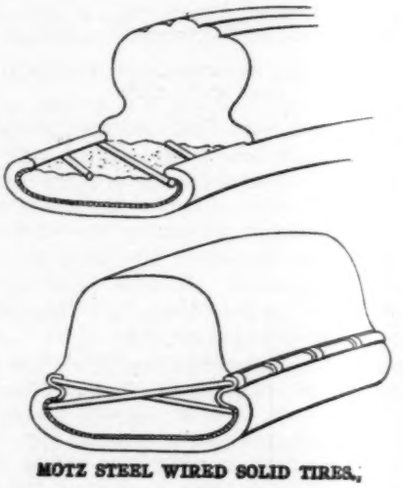
The Mitchell tire, shown by the Mitchell Punctureless Pneumatic Tire Co., is made for use on a special steel rim having a deep annular channel in which is set a pneumatic tire without the usual canvas tread. On the periphery of this air cushion rests a series of solid rubber blocks or "legs," slidably



G & J RELEASING TIRE TOOL.

held between two channel rings bolted to the inner edges of the rim. These channel rings clamp and hold the beaded edges of an outer tire or tread of semicircular section. The solid rubber leg or block is in contact with the inner face of the outer tire. By this construction there is a combination of the non-puncturing quality of the solid rubber tire with the air cushion of the pneumatic tire.

Solid clincher tires for pleasure cars and commercial vehicles were displayed by the



MOTZ STEEL WIRED SOLID TIRES.

Motz Clincher Tire & Rubber Co. This tire is secured to the rim by steel wires which go all the way across and so practically make the tire integral with the rim.

An exhibit of the Fawkes airless clincher tires included solid tires especially adapted to light truck and delivery wagon service.

A peculiar situation, the settlement of which is awaited with considerable interest by the importing trade and the patrons of that branch of the automobile industry, has developed with reference to the Mercedes line. Visitors at the New York shows were somewhat surprised to find the 1906 chassis of the Mercedes exhibited at the Armory, instead of Madison Square Garden, where Smith & Mabley, Inc., who have heretofore sold this car, were also showing some Mercedes machines. Inquiry at the offices of the Mercedes Import Co., Broadway and Forty-second street, elicited the following official statement from that corporation:

"We have a fifteen year contract with the German makers, and we have the cars. In the future we will do all our own selling to the customer direct at retail, and will make deliveries from our new salesrooms."

Smith & Mabley, Inc., when asked for an expression on the situation, stated that they did not wish to issue a statement at the present time.

Don't imagine that because a car will run for perhaps a whole season without a breakdown that it is immune from trouble. Do not let this prevent you from continuing to exercise care and common sense in its management.

Additional Car and Chassis Descriptions.

IN the report of an exhibition of such vast proportions and of such a comprehensive nature as the New York shows a few complete cars and chassis must of necessity fail of inclusion in the first round of examination and discussion.

This is due not merely to the delayed arrival of a number of exhibits, but also to the unprecedented demand for attention on the part of the prospective purchaser who has this year more seriously than ever before closely inquired into the fine points of material and construction.

While this fact rendered the task of obtaining first-hand information regarding the exhibits more difficult than ever for the pressmen to secure from attendants at the booths, the desire on the part of the public for an intimate knowledge of the mechanism of the automobile is an excellent sign. There are no longer such broad inquiries as relate only to color and upholstery, though these details of finish are by no means overlooked. The change has come in the way of an appreciation rather of the vital organs of the self-propelled vehicle, and the average visitor at the shows knows what he is talking about and understands what he is told.

In all cases the car or chassis descriptions which follow may be accepted as authoritative, such data as are given being obtained from personal representatives in attendance at each exhibit.

WESTINGHOUSE COMPANIES.—A beautifully finished chassis built in the factory of the Société Anonyme Westinghouse, at Havre, France, was one of the features of the Armory show. This concern, which is a part of the Westinghouse interests, has been seriously investigating automobile construction, and the chassis was constructed after designs by Albert Schmid, consulting engineer and a director in the French company. Mr. Schmid was at one time superintendent of the Pittsburg plant of the Westinghouse and is a prolific inventor. He has been interested in automobile engineering since the early days of the self-propelled vehicle, and the chassis shown for the first time in this country is an evidence of his skill as a designer of automobiles of the highest class.

The motor, which has four cylinders cast in pairs, is rated at 40 horsepower and has the usual mechanically actuated valves, operated from two cam-shafts; make and break ignition from a low-tension magneto, gear-driven centrifugal pump and flywheel fan. A cellular radiator is used, and the piping to and from the engine is unusually direct. A carbureter of Westinghouse make is used, which has a water jacket with circulation supplied from the piping between the top of the motor and the radiator. This shunt pipe is fitted with a regulating valve so that any desired amount of water may be allowed to pass through the jacket or the supply entirely shut off.

To provide an automatic auxiliary air supply two inlet valves are fitted to the carbureter, one under tension of a weak spring, to open at moderate engine speeds, and a second under tension of a stiffer spring, to open only on high speeds. The arrangement is claimed to work advantageously under varying atmospheric conditions.

A limiting governor is fitted, which is set to act when the engine speed reaches 1,200 revolutions per minute, but the governor is not interconnected with throttle or accelerator, acting in its limiting function when the clutch is thrown out of engagement with throttle open and spark avanced. Under load on a level the governor is designed to provide a maximum speed beyond which the motor cannot be accelerated.

The flywheel is formed with fan vanes, the usual fan in front of the motor being eliminated. A clutch of the multiple disc type running in oil provides gradual engagement of power. The transmission gives four speeds forward and reverse, with drive through one gear on the primary and one on the secondary shaft, with speed changes selectively made by a single lever working in a gate quadrant.

The braking is accomplished by two external contracting, metal-to-metal brakes, one located on the forward end of the secondary shaft, which is extended through the transmission case, and the other on the differential or cross shaft. Both are water-cooled, the water being supplied from a small tank carried on the frame and the water automatically turned on by means of a valve interconnected with the service brake lever rock shaft, which is provided with suitable fingers to raise and depress the plunger controlling the valve. The usual rear wheel emergency brakes are fitted inside of the drums which carry the rear wheel chain sprockets.

The frame, of conventional type, is of nickel steel and all parts of the chassis are carefully designed with reference to material as well as form and finish, there being a number of special steels of various alloys entering into the make-up of the car. All bearings, except in the engine, are D. W. F. non-adjustable type, and the efficiency of the power plant is said to suffer a surprisingly small loss through transmission to the rear wheels.

DOUGLAS ANDREWS.—As selling agent for the E. W. Bliss Company's new cars, this exhibitor showed in a room in the Armory the first cars made by this big Brooklyn engineering company that were ever publicly displayed. The exhibit consisted of a chassis in rough finish and a big side-entrance touring car with canopy top, the body finish being royal blue with white striping and blue leather upholstery. The pressed frame of these cars is of chrome nickel steel throughout and the I-section axles of drop forged nickel steel. The four-cylinders of the vertical engine are cast in pairs, with integral jackets, the inlet and exhaust valve chambers being on opposite sides of the heads. The bore and stroke are 4 1-2 by 6 inches respectively, and the horsepower 30. A high-tension Lacoste magneto provides current for the jump spark ignition, the distributer being mounted on the front of the dash under the hood. The radiator is of the gilled tubular type and the water pump is driven by spur gears between the rear end of the engine and the flywheel. The same gears turn the camshafts and drive the magneto. The steering gear is directly opposite the middle of the engine below the carbureter, having, as in many new cars, been placed forward of the old position under the dash. A ball governor on the camshaft gear acts on the throttle to control the engine speed.

A RELIC AT THE ARMORY SHOW. THE ORIGINAL HENRY FORD RUNABOUT.

Positive sight-feed lubrication is effected by the aid of a plunger pump actuated by a cam on the rear end of the inlet valve camshaft. The clutch is of the helical spring type acting in the enlarged hub of the flywheel, outside of which the spokes are formed in fan blades. Four forward speed changes are obtained from the unit progressive type sliding gear transmission which has double pinion drive to the cross-shaft. Hess-Bright ball bearings are used throughout the car except in the engine bearings. Internal expanding brakes are fitted on the cross-shaft and on the rear wheel drums, the latter entirely enclosed. An aluminum pan under the engine and transmission protect these parts from mud and dust.

LANE MOTOR VEHICLE CO.—One of the few steam cars on exhibition at the 1906 shows was the Lane, exhibited by this company in the Armory. With the exception of the condenser in front, consisting of a series of vertical flattened brass tubes with an air-deflecting cap at the top of the condenser to throw a current of air down behind the tubing, the car could with difficulty be distinguished from an up-to-date gasoline side-entrance touring car. The finish was drab, with gold and black striping, and the upholstering in red leather, with black leather victoria top. Features characteristic of this car are a semi-flash boiler set under the hood in front, between the dash and water tank, a three-cylinder compound steam engine set in inclined position below the front seat and driving by single center chain to the differential on the rear axle. Improvements for 1906 consist in a change from the King of the Belgians body to simpler lines, changes in the bonnet, placing the automatic water pump outside of the engine case, so that any leakage arising from wearing of the packing will not get into the lubricating oil, placing the tool boxes under the side running board, an aluminum cover over all the valve hand wheels on the dash, and roller bearings on the engine shaft. The gasoline, water and air pumps are all driven automatically by the engine, the air pump, which is located inside the crankcase, having an outside adjustment screw for constricting the passage. All heat developed in the Lane car is kept forward under the hood; one side lever operates the brakes and another reverses the engine, while a pedal on the footboard actuates the simpling device by which all three cylinders are caused to take live steam from the generator, thereby increasing the power on hills and when starting. The frame of the car is of angle steel riveted together, the wheels are of the artillery type, and the gasoline tank of pressed steel.

R. BERTELLI & CO.—A regular stock 40-50 horsepower chassis of the Zust car built by the Fabrica Italiana di Automobili, of Milan, Italy, was exhibited by this firm, which has the sole American agency for the Zust cars. The chassis was shown rough finished. The four vertical cylinders are cast in pairs with integral jackets. Inlet and exhaust valves are all on the left side of the engine and are mechanically operated by one camshaft located in the crankcase. Make and break ignition is used, current being generated by a spur gear-driven magneto. The same shaft that drives the magneto also drives the water circulating pump. A force-feed oiler on the dash is driven by a belt from the engine. The gasoline is pressure-fed to the carbureter, pressure being taken from the exhaust gas of the engine, while an auxiliary hand pump is provided on the dash for obtaining pressure when the engine is "dead." The gasoline tank is carried under the extreme rear of the frame, as is customary in large foreign cars. The change speed gearing is of the selective type, giving four forward speeds and one reverse, both the primary and secondary shafts of the transmission driving by bevel gears to the countershaft through the differential. Drive is by side chains from countershaft to rear wheels. Internal expanding brakes act on the rear wheel drums, which are all closed in to exclude dirt and water. There is a large constricting band brake on the countershaft. Both front and rear axles are drop forged to I section and have a deep drop, bringing the center of the car close to the ground.

EISENHUTH HORSELESS VEHICLE CO.—Four Compound cars were displayed by this New England concern. The chief distinguishing characteristic of all is the use of an internal combustion engine having two high-pressure cylinders and one low-pressure cylinder of larger bore set between them, all disposed vertically under the hood. The low-pressure cylinder utilizes the pressure of the gases expelled from the high-pressure cylinders on either side. The valve mechanism, which differs somewhat from the usual construction as a result of this feature, was admirably revealed by means of an engine mounted on a stand and driven slowly by a belt running over the flywheel from a small electric motor. The cylinders were sectioned vertically and transverse sections removed from the valve chambers showed their synchronous operation. Aside from the compound engine, whence the trade name of the car is derived, the vehicles exhibited showed no radical departures from accepted practice. One of the machines was a 16-horsepower, side-entrance touring car, finished in rich maroon, upholstered in dark red leather. A model of the 24-30 horsepower machine was shown, with side-entrance phaeton body and victoria top, the finish being maroon, with maroon-colored leather upholstery and black leather top. The 16-horsepower Doctor Compound for physicians' use had a victoria top on a body with piano box rear end for the reception of a case of surgical instruments, a medicine case, extra clothing, and similar articles. The car was finished in black all over. The fourth model shown was a 16-horsepower covered delivery wagon, the body being raised high above the chassis on wooden horses, revealing the three-speed sliding gear transmission driving to countershaft, from which side chains transmit to the rear road wheels.

KOBUSCH AUTOMOBILE CO.—This concern, newly organized in St. Louis for the purpose of manufacturing a copy of the well-known Mors, was unable to secure suitable space at the Armory and during the show week has had a complete car on view at the Waldorf-Astoria, with an additional machine in commission outside for demonstrations.

The finished car shown is a 35 horsepower limousine, body by Demarest. In a close examination there is not any detail observable which is not an exact copy of the car turned out by the French company. In this connection it may be stated that arrangements were made some time ago by George J. Kobusch, president of the company, with the Société Anonyme Mors for the exclusive right to manufacture, under their patents, this well-known car. The materials entering into the construction are imported from the same concerns who furnish these materials to the parent company. In the construction of the chassis the greatest care is exercised to follow the exact methods of the French constructors, and the resultant mechanism is of a high order of excellence.

Pressed nickel steel frame members are used, and steels of special alloys in all vital parts. The engine is an individual cylinder motor with valves on opposite sides, ignition make and break from low-tension magneto gear driven from cam-shaft. Cooling is by usual water circulation through a bank of gilled tubes, with supplementary water supply contained in a tank at the rear of the chassis.

The transmission from the motor is through a speed change system of the typical Mors sliding gear type, but with only two gears driving on the first, second, and third speeds. The secondary gear shaft is fitted with a bevel pinion which engages with a bevel gear on the differential shaft, and for all speeds except fourth drive is through this set. On high speed the primary shaft is locked by means of suitable clutches and the drive is then through the bevel pinion and gear on the primary and differential shafts. The idler for effecting a reverse of the secondary shaft is in mesh only when the change speed lever is placed in the reverse notch on the quadrant, being slidably mounted on its shaft and thrown out of engagement automatically by the action of a helical spring when the reverse is disengaged.

A convenient little detail noticed in the transmission system is the fitting of a manhole at the side of the case, extending to the bottom and removable for proper flushing of the gears with kerosene or gasoline. A try-cock is also fitted to the case so that the proper oil level may be found and to let a sufficient amount escape in case too much oil has been supplied. Try-cocks are also fitted to the crank case, one to each com-

partment, and their use should minimize smoky exhaust and ignition troubles.

The only details changed in the car from the French model is in an increase of road clearance of 1 1-2 inches and in the use of springs of greater stiffness, and all parts are to be made to gauge interchangeable with the corresponding parts of the Mors.

Three models will be regularly built, a 20 and a 35 horsepower with individual cast cylinders, and a 50 horsepower with cylinders in pairs. In addition, an 80 horsepower chassis will be built to order.

BERKSHIRE AUTOMOBILE CO.—A 20-horsepower Berkshire chassis in the rough and a 30-horsepower, side-entrance phaeton fitted with extension top and finished all in black constituted the display made by this Massachusetts company. These cars follow the French type, having four-cylinder vertical engines in front and pressed steel frames. The cylinders are cast separately with integral water jackets, and the engine with its crankcase is set on a sub-frame that also carries the transmission mechanism. Valves are on opposite sides of the cylinder heads and are all mechanically operated. The water pump is gear driven and lubrication is by gravity feed and splash in the crankcase. The clutch is of the leather-faced cone type, and the change-speed gears are on a sliding shaft giving three changes forward and one reverse. All gear shifts are by one lever; the gears are always in mesh and run in an oil bath. Drive is by bevel gears to the differential on a countershaft and thence by side chains. The crankshaft has five bearings and is drilled with ducts that lead the lubricating oil from these bearings to the connecting rod bearings. Hess-Bright ball bearings are fitted in the wheels, and the springs have supplemental leaves under compression above the longest leaves, the effect being to counteract excessive play of the springs on rough roads. The axles are drop forged.

J. C. WICHMANN AUTOMOBILE GESELLSCHAFT.—One of the late arrivals at the Armory show during the week was a chassis of the 50-60-horsepower Argus car made in Hamburg and Berlin, Germany, and now handled in this country by the concern named. While following the general modern practice of European constructors, this car has a number of novel features. Perhaps foremost of these is a pair of small pumps on the engine for maintaining air pressure on the gasoline and the lubricating oil. The plungers of these pumps are worked through a connection with the valve push rods and when the pressure reaches a predetermined maximum they automatically cease to act. Two auxiliary hand pumps mounted on the dash at either end of the lubricator serve to develop pressure when the engine is dead and there is no air under pressure in the tank. The water circulation is a combination of the thermo-syphonic and pump systems. Two fiber buss tubes carry the high tension ignition cables across the tops of the cylinders. A double system of ignition is provided, there being eight spark plugs, four for high-tension magneto generator. The clutch is of the helical spring type and is so constructed that when released it keeps the engine from racing until the governor comes into action to throttle the gas. Camshaft gears are mounted between the flywheel and the rear cylinder. The crankshaft bearings are of unusual length both at the rear end and in the center. Lowe ball bearings are used throughout the four speed sliding gear transmission. The reverse pinion is mounted above the gears on the primary shaft and reverse motion is obtained by pushing the gear lever forward in its H slot. First forward speed is also obtained by a forward push, while the intermediate and high speeds are obtained by pulling the lever back. The spring hangers are bolted directly through the pressed steel side frames and the rear spring horns, instead of being made of a solid forging riveted to the frame sides, consist of a series of spring leaves forming the rear half of a semi-elliptic spring. These horns, besides being downwardly curved, have a lateral bend to bring their rear ends out far enough to meet the rear ends of the semi-elliptic springs mounted on the axle.

Motorcycles and Tri-cars for 1906.

THOUGH a comparatively inconspicuous feature at American automobile shows, the motorcycle was on view at a number of stands in the Armory, the exhibits of this character, including fore-carriage tri-cars, being confined to the Club show, with a single exception.

The Hendee Manufacturing Company, builder of the "Indian" motorcycle, exhibited an ordinary roadster, a two-cylinder 4 1-2-horsepower racer, and two fore-carriage tri-cars, one for passengers and one for parcels.

There have been no radical changes made in the regular roadster. The motor has, however, been increased to 2 5-8-inch bore and 3 1-4-inch stroke, and is now rated at 2 1-4 horsepower. The tires have been increased to 2 1-4 inches. The drive is of the well-known double-chain type, the motor making 7 1-3 revolutions to one of the rear wheel.

The Thor compensating friction yielding sprocket is used on the countershaft to prevent undue strain on the chain when starting or running at low speed.

The racer is along the same general lines of the roadster, with the exception that the tanks are made smaller to save weight. The cylinders both work on the same crankshaft and are set at a slight angle to each other. Ignition is by single coil and distributer.

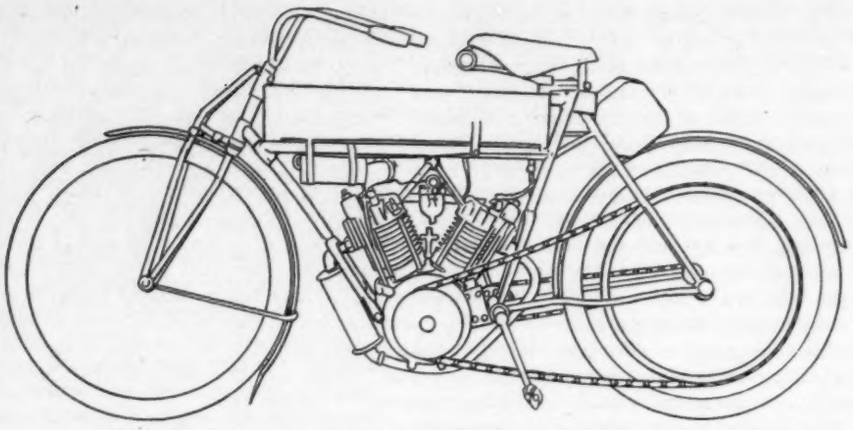
The tri-cars are formed by removing the front wheels and forks of an ordinary motorcycle and substituting the attachment; this entire operation takes about ten minutes for either change.

The special features of the Indian are the double-chain drive and yielding sprocket and the double grip control. The right-hand grip first puts the exhaust valve lifter out of action, then turns on the ignition current, and then advances the spark as the handle is turned from one. The left-hand grip is used in a similar manner to open or close the throttle.

The Reading Standard Cycle Company exhibited the "Thoroughbred" motorcycle, also a machine fitted with tandem attachment, and one fitted with a side carriage for a passenger. This machine follows very closely the lines of the Indian, the only difference being the placing of the battery box and the oil and gasoline tanks; the mechanism of the grip control also being slightly different.

The Aster Company exhibited a large 5-horsepower, water-cooled tri-car of a type popular abroad. Drive is by chain to rear wheel; there is a two-speed gear, and the

EXHIBIT OF THE INDIAN MOTORCYCLES AND TRI-CARS IN THE ARMORY.



CURTISS DOUBLE-CYLINDER BELT TRANSMISSION 5-H.P. MOTORCYCLE AT THE SHOW.

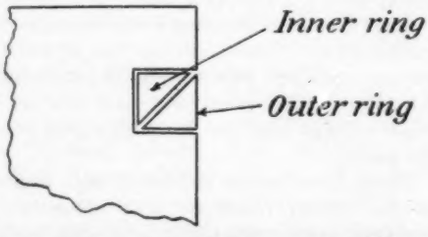
motor is started by a crank. If this machine did not have a saddle for the driver's seat it could hardly be classed as a motorcycle, as there are no pedals.

The American Motor Company exhibited a "Marsh" single-cylinder machine, 1906 model. The most conspicuous new features on this machine are a double-valve automatic carbureter, one valve acting for low and moderate speeds, and the other for moderate to high speeds, the use of a ball contact ignition timer, and the addition of a spring fork. The machine is belt-driven, a flat belt being used, slack being taken up by an idler.

The company also exhibited the "Metz" two-cylinder 4-horsepower chain-driven machine. This machine has double grip control, single chain drive with spring idler to take up slack, and compensating friction sprocket on rear wheel. The chain used is a double roller three-fourths pitch, three-eighths wide and five-eighths roller. Ignition is by single coil and distributer.

The Wagoner Cycle Co. exhibited two machines, a single and a drop frame tandem. These machines are similar in respect to motor equipment; the motor is rated at three horsepower; drive is by triangular or V belt, the slack taken up by an idler. The tandem has the drop frame placed in rear.

The G. H. Curtiss Manufacturing Co. exhibited two "Curtiss" machines, a single and a double cylinder. The machines present several interesting features. The motors are furnished with roller bearings to crankshaft. The single cylinder is rated at 2 1-2 horsepower, and the double at 5 horsepower. One of the most interesting points on this machine is the belt used for transmission; this is warranted not to stretch, and the manufacturer shows faith in this drive by not providing the machine with an idler. It is of the so-called 28 degrees V type, but is of rather peculiar construction. There is an outer belt of double thickness, mineral-tanned leather stitched together, having an entire thickness of one-fourth inch. There is also an inner belt of the same thickness. The outer and inner belts are separated by distance pieces one inch long and one inch apart. The whole is united by a large copper rivet passing through each distance piece. This belt runs in a V-shaped groove in the belt wheels which is considerably deeper than the thickness of the belt. The tendency, when a pull is put on the belt, is to crowd down the belt further into the rim, thus making it grip all the harder instead of tending to slip, as with a flat belt.



SECTION OF YALE-CALIFORNIA PISTON SHOWING DOUBLE RINGS.

The only motorcycle at the Garden show was the "Yale California," made by the Consolidated Manufacturing Co. It presents, however, quite a number of interesting features. The drive is by flat belt, and a neat spring idler is provided, the tension of which may be instantly adjusted without the use of tools.

The motor is conservatively rated at 2 horsepower, being 2 3-4-inch bore and 3-inch stroke. A large outside flywheel is used which conduces to steady running at low speeds. There are four double piston rings used. The construction of these rings is somewhat novel; they are of right triangular section, two placed in a groove so as to break joints. The machine is fitted with a spring fork.

The use of non-vibrator coils with dry batteries for ignition purposes, is the universal practice on American motorcycles. Splash lubrication is also universal, with the use of either sight feed or the introduction of a measured quantity of oil to the crankcase at intervals about equally divided.

Opinion also seems to be about equally divided between belt and chain drive, with the chain gaining in favor. General practice favors motors from 2 to 2 1-2 horsepower, geared about 6 to 1 on the average.

Demonstrations at the Shows.

Twelve months has vastly increased the general knowledge of the buying public concerning automobiles. A careful summarizing of the expressions of representative tradesmen at the recent shows emphasizes this. Time was when a practical demonstration was considered an essential in negotiating a sale at the show; now the demonstration has been relegated to a position of secondary importance as a selling factor.

The number of demonstrating cars in attendance outside both the Garden and the Armory shows was greater than ever, and the same system of making bookings with

DEMONSTRATING A REO RUNABOUT OUTSIDE THE ARMORY AUTOMOBILE SHOW.

prospective customers, and the issuing of identification checks prevailed, but most of the actual sales were made direct from the floor, notwithstanding—the reputation of the selling houses in many instances being responsible for this. The large proportion of those who asked for demonstrations, expressed a desire to test the easy riding qualities of the springs supporting the body, or a wish to test the noiselessness of the exhaust and geared working parts, severally or individually.

From a picturesque viewpoint the array of demonstrating cars was impressive. On three sides of both show buildings, each day, in the early morning, hundreds of machines lined up with military exactness, those on Fourth avenue and Lexington avenue facing toward the center of the street. On the side streets the cars were lined up in single file, one behind the other. The air of bustle and activity, the picturesque costumes of the chauffeurs, the businesslike bearing of both customers and salesmen, lent an air of individuality to the shows and favorably impressed an observing public.

And the business world paused, carefully noted and stored away for future reference the well demonstrated qualities of the commercial vehicles for freight carrying purposes. These important vehicles were never so much in evidence as this year. Fully two score maneuvered all day long on the streets adjacent to the exhibition buildings, carrying various cargoes, from sample loads of pig-iron to boxes of fashionable millinery. All told the same story—efficiency, ease in handling and a ready adaptation to the requirements of the business.

No violations of the speed limit by the operators of the demonstratng cars were reported during the shows. This may be considered a further proof of the perfected education of both the customer and professional driver in the requirements of the law. When the increased number of demonstrating cars incident to two shows is considered, together with the number of out-of-town drivers presumably unfamiliar with local regulations, the fact that no volations of the law occurred is certainly remarkable.

Names of Garden Show Attendants

THE gathering of sales representatives of automobile manufacturers is an annual feature of the shows,and is always looked forward to with pleasant anticipation and long remembered. They come from all parts of the Union, and meet in a fraternal spirit. Among those at the Garden complete vehicle stands were the following:

Auto Import Co.—J. S. Joseph, Benj. Eichberg, John G. Dale, H. B. Hills, Jr., H. A. Conners.

Apperson Bros. Automobile Co.—Elmer Apperson, Edgar Apperson, G. E. Bruner, L. A. Hopkins, Fred. P. Brand, Alex M. Benson, Geo. M. Brown.

The Autocar Co.—Louis S. Clarke, John Clarke, John Calder, A. H. Whiting, A. L. Goddard, J. S. Stavers, Fred S. Smith, Louis Geyler, Geo. Middleton, Palmer Abbott, Albert J. King, W. G. Brooks, Samuel F. Randolph, Raymond Hitchcock, William Richwine, R. T. Newton, M. J. Wolfe.

Babcock Electric Carriage Co.—F. A. Babcock, C. A. Benjamin, E. R. Whitney.

Sidney B. Bowman & Co.—Clovis Bertron, Victor Villar, Capt. Rawson Turner, Sidney B. Bowman.

Buick Motor Co.—W. C. Durant, H. E. Shiland, W. Kerr, C. C. Coddington, H. J. Koehler, C. Barrows, J. O. Norcross, W. E. Eldridge, F. Stranahan, W. C. Jaynes, Sidney Black, Mrs. Post, H. Fredericks, Chas. Grant, George Grant, C. H. Dill.

Columbus Buggy Co.—Charles E. Firestone, J. Firestone, O. H. Perry, G. M. Bacon, Frank Warfield, J. W. Delamater.

Cantono Electric Tractor Co.—Chas. I. Scott, H. W. Scott, G. Mazagretti, H. Nicot, Paul de la Chesney, A. Lichtenstadter, W. Thorner.

Cadillac Motor Car Co.—Lem. W. Bowen, A. E. F. White, Wm. H. Murphy, W. C. Leland, H. M. Leland, E. E. Sweet, and twelve members of the mechanical board, W. E. Metzger, J. Elmer Pratt, H. M. Hoblitt, K. P. Drysdale, George Craven, William Krafve, W. C. Martin, Geo. E. Blakeslee.

De Dietrich Import Co.—Walter C. Allen, Chas. Duval, E. H. Cox.

Decauville Automobile Co.—E. S. Partridge, C. F. Wyckoff, Herbert Rose, Stephen Thorn, William Swan, Edward Hayes.

Elmore Mfg. Co.—J. H. Becker, B. A. Becker, W. W. Gawthrop, A. E. Ranney, A. M. Day, A. J. Robinson, N. Davis.

Electric Vehicle Co.—M. J. Budlong, W G. Henderson, Harry W. Kyte, D. W. Henry, W. H. Durffy, C. C. Barrows, W. W. Burke, Fred W. Nichols, F. E. Dayton, E. C. Bald, J. J. Gaffney, G. E. Risley, George Middleton, Louis Fitzgerald, W. A. Evans, John Crittenden, John Milliken.

H. H. Franklin Mfg. Co.—Alexander T. Brown, W. C. Lipe, H. H. Franklin, H. K. Chadwick, F. A. Barton, John Wilkinson, A. R. Bangs, Percy L. Neal, Fred Pardee, T. P. Howell, H. C. Murray, M. C. Moulton, F. R. Bump, S. J. Marshall, C. E. Wheeler, S. C. Crane.

Gallia Electric Carriages.—Bernard Maurice Dufresne, Count Armand de Gontaut Biron.

Hewitt Motor Co.—E. R. Hewitt, G. W. Phillips, C. L. Cummings, C. O. Snyder, Frank Keegan.

Haynes Automobile Co.—Elwood Haynes, John Haynes, Frank Nutt, C. B. Warren, C. C. Cartwright, Francis Fanning, John Gibson, E. S. Breed, J. B. Deibler, F. G. Carrie.

Knox Automobile Co.—E. H. Cutler, W. E. Wright, A. E. Smith, H. G. Farr, James Jones, C. R. Culver, Geo. A. Crane, S. A. Miner, Frank Billings, George Reed, A. P. Underhill, H. E. Bradford, O. F. Springer, G. R. Hunnewell, Chas. Brewster, R. W. Blake, A. G. Grundler, E. A. Hale, Chas. Van Stone, F. L. Thomas, John Collins, H. M. Davis, C. H. Martin, George Kerr, R. T. Allcutt.

Locomobile Company of America.—S. T. Davis, Jr., A. L. Riker, Thomas H. Thomas, E. F. Russell, A. W. Robinson, M. V. Doud, D. C. Carson, I. J. Morse, J. H. MacAlman, A. J. Banta, K. M. Blake, J. F. Plummer, J. A. Kingman, G. A. Knowles, H. W. Lincoln, C. E. Scott, J. A. North.

F. A. La Roche Co.—Ralph Temple, Wm. Hyslop, Wm. Kearney, Ernest D. Nevin, C. D. Cook, Henry Mehl, George Debecker, Geo. M. MacWilliam, Samuel H. Shaw, William Murphy.

Matheson Motor Car Co., Ltd.—F. H. Matheson, C. M. Matheson, Henry U. Palmer, Charles Singer, Charles R. Greuter.

Northern Mfg. Co.—W. T. Barbour, G. B. Gunderson, V. M. Gunderson, Chas. B. King, Clinton Hunter, McKie Walker, Peter Fogarty.

Olds Motor Works.—Henry Russell, Fred L. Smith, Angus Smith, George Dunham, R. D. Chapin, R. B. Hamilton, Frederick Sager, C. H. Larson, Gen. John T. Cutting, Robert Phelps, F. Stokes, R. Jackson H. E. Coffin, W. O. Adams, R. R. Owen, Jas. J. Brady.

Packard Motor Car Co.—H. B. Joy, C. J. Moore, W. L. Gleason, E. Roberts, S. D. Waldron, W. L. Conkling, E. Dobinson, C. G. Culver E. H. Godshalk, Alvin T. Fuller, F. J. Pardee, Wm. Murray, F. I. Alliger.

Peerless Motor Car Co.—J. W. McClymonds, L. H. Kittredge, E. H. Parkhurst, C. Wridgway, E. W. Wridgway, J. A. Clark, Geo. T. Thompson, Harry Savage, J. L. Snow, Louis Sackett, F. M. Stettler.

Geo. N. Pierce Co.—Geo. N. Pierce, Chas. Clifton D. Ferguson, Henry May, Chas. Sheppy, Percy Pierce, Geo. Cooke, Edw. Rounds, Robert Patton, J. W. Maguire, H. Paulman, J. V. Lawrence, Marion Lambert, Garnett Zorn, Charles Joy, W. H. Ellis, F. A. Nickerson E. C. Bull, F. S. Dey, W. J. Foss, Archie Hughes, D. A. Clark.

Pope Manufacturing Co.—Col. Albert A. Pope, Albert L. Pope, Col. Geo. Pope, Chas. E. Walker, Wilbur C. Walker, Harold L. Pope, F. C. Gilbert, D. H. Hinsman, J. F. Cox, Ned Lawrence, Fred L. Buckbee, F. M. Ridler, J. P. Fogarty, Edw. Dugan, W. H. Keller, A. E. Schaaf, F. M. Keeton, J. E. Hade, H. L. Haskell, R. V. Law, W. N. Taylor, H. G. Fisk, H. H. Rice, W. C. Johnson, H. A. Downing, Henry Goodman,

H. A. Leinhardt, Robert L. Winkley, J. W. Drown, Elliott Mason, R. E. Fulton, C. W. Spencer, R. M. Barwise, P. V. Clodio.

Royal Motor Car Co.—E. D. Shurmer, T. F. Newman, A. D. McLachlan, Robert Jardine, Geo. H. Bowler, Chas. A. Duerr, Geo. J. Dunham, Jos. McDuffee, G. Hilton Gantert, Maj. Francis H. Schoeffel, G. B. Demarest, W. G. Spencer, W. B. Murray, E. Shriver Reese, H. B. and W. Phinney, D. C. Pinney.

J. Stevens Arms & Tool Co.—I. G. Page, Frank Duryea, C. C. Hildebrand, A. W. Barber, Duffield Miles, Wm. Remington, Frank Eveland.

Smith & Mabley, Inc.—C. R. Mabley, A. D. Proctor Smith, Clair M. Hamilton, J. S. Bunting, Wm. P. Kennedy, Knight Neftel, W. A. Rue, H. Armour Smith, S. S. Thornton, F. E. Weir, J. V. Koch, Jr., Malcolm A. Strauss, A. J. M. Edwards, John Muller, Jr., Frank Dudgeon.

Studebaker Automobile Co.—Col. George M. Studebaker, T. W. Goodridge, A. M. Welch, H. Vanderbeek, Harry Fosdick, Jewell Dowling, W. R. Inness, Peter Dumont, R. T. Peckham.

F. B. Stearns Co.—F. B. Stearns, Roy F. York, George F. Woolston, Jas. H. Crawford, Robert J. Walsh, A. S. Holden, P. J. Sterling, W. B. Robinson.

E. R. Thomas Motor Co.—E. R. Thomas Ezra E. Kirk, M. B. Hatch, H. J. Hass, George Salzman, Chas. S. Henshaw, R. D. Henshaw, C. A. Kingsley, A. H. Martin, C. A. Coey, F. H. Dart, Fred R. Harper, H. A. Meeks, C. K. Smith, John Harrington.

Vehicle Equipment Co.—Robert Lloyd, H. H. Havemeyer, Arthur Havemeyer, H. D. Lloyd, A. J. Doty, C. G. Rainier, R. W. Maginnis, J. R. Kinsey, Thos. E. Martin, R. H. Doughty, Raymond Havemeyer, Thomas Le Boutillier, A. Bogardus, P. C. Chrysler, C. P. Jeager, W. L. Brown.

Walter Automobile Co.—J. R. Vanderveer, William Walter.

Waltham-Orient Mfg. Co.—Harrison Williams, L. B. Gaylor, E. P. Chalfant, W. H. Little, S. M. How.

Winton Motor Car Co.—Thos. Henderson, George H. Brown, Charles B. Shanks, Chas. W. Mears, Percy Owen, F. A. Hinchliffe, A. E. Maltby, C. W. Churchill, Harry Owesney, George Arbuckle, Chas. Calvert, J. A. Foster, J. Hervey Nichols, E. A. Godfrey, C. S. Wilcox.

Names of Armory Show Attendants.

REPRESENTATIVES of automobile manufacturers were as numerous at the Armory as at the Garden, the number being about equally divided between the two shows. There were at the stands many whose names are closely identified with the industry, as the following list shows:

Acme Motor Car Co.—P. A. Fogarty, J. J. Delong, J. McCutcheon, I. Lengal, D. Webster, Arthur A. Devlin, Frank A. Devlin.

The Aerocar Co.—H. H. Thorpe, W. G. Morley, Alex. Y. Malcolmson, George S. Lisee, Mr. Pfahler.

Reo Motor Car Co.—R. C. Rueshaw, R. E. Ingersoll, Thos. Peter Cooper Forbes, D. S. Whitfield, C. F. Gilmour, R. E. Olds, R. M. Owen.

Austin Automobile Co.—Walter S. Austin, Frank A. Sanford.

American Locomotive Motor Cars.—Albert T. Otto, James Joyce, William M. Turner, W. G. Houck, Mr. Whitford, George B. Adams.

Aster Co.—A. Epstein, A. C. Thompson, Frederick Komp, Arthur Myers.

Central Park Auto Storage Co. (Spyker).—M. C. Overman, Lester G. Bruggeman.

Ariel Motor Car Co.—Ralph C. Lewis, C. Herbert Covell.

American Peugeot Automobile Co.—I. W. England, J. Dubois, Mr. Bannister Reynolds.

American Mercedes Co.—L. B. Smith, C. M. Bouggy, Frank S. Ray, Fred. Bremmer, "Ben" Benson.

Léon Bollée Agency of America.—H. L. Moody, Norris N. Mason, Fred. Spencer, Emile Bondy, F. O. Moody.

Berkshire and Bliss Automobiles.—F. V. Whyland, F. A. Knight, Douglas Andrews, Charles Tate, N. Van Sicklen.

The Bartholomew Co. (Glide).—J. B. Bartholomew, R. A. Whitney, G. G. Luthy, L. C. Wheeler, R. Holmes.

Marion Motor Car Co.—J. S. Conwell, R. H. Hassler.

Baker Motor Vehicle Co.—M. L. Goss, C. B. Rice, J. W. Harper, Harold Bostle.

Thos. B. Jeffery & Co.—G. W. Bennett, E. A. Gilmore, Walter Clapp, Jr., George H. Connor, C. A. Gilmore, George Cox, H. W. Shattuck.

Buckeye Mfg. Co. (Lambert).—J. W. Lambert, G. B. Lauderback, E. McLean, D. McLean, F. L. Hiller, E. E. Brode, A. R. Lambert.

Cleveland Motor Car Co.—W. L. Colt, L. B. Butler, R. H. Gallagher, F. E. Parker, A. R. Davis, A. B. Mamley, Arthur Garford.

Auto Car Equipment Co.—E. B. Olmsted, Wm. F. Dobert.

Cryder & Co. (Léon Bollée).—Henry C. Cryder, Paul Demeny, Henri Didier.

Corbin Motor Vehicle Corporation.—J. S. Bretz, E. T. Kimball, B. F. Blaney, Lafayette Markle, Herbert Levick, Mr. Moore, Perkins, Bird, Perkins.

Chadwick Motor Car Co.—E. B. Jackson, Clarence Rowe, S. E. Oplinger.

Commercial Motor Car Co.—Arthur J. Slade, Wolcott Remington.

The Compound.—Geo. T. Schull, D. F. Graham, F. C. Carter, C. P. Hatch.

Crawford Auto Co.—R. S. Crawford, Chas. Morgan, Clifford Parks, Wm. Long, Jos. Troxell.

Carey (Revolving Cylinder) Motors.—C. R. Bissell.

"C. G. V."—Julian Bloch, J. McAvoy, Jesse J. Beitler, Henri Leconte, J. Ullmann.

Panhard & Levassor.—A. Massénet, Ade Magnin, G. W. Post, Jr., Fred. Brevogel.

Detroit Auto Vehicle Co. (Crown).—H. W. Nichoalds, Theo. Hinterman, E. B. Kennedy.

Dolson Automobile Co.—D. E. Dolson, W. H. Vinal, W. A. Schaum, John A. Seaverns, H. W. Doherty.

Dorris Motor Car Co.—G. P. Dorris, H. B. Krenning.

Duryea Power Co.—C. E. Duryea, R. C. Aldrich, Louis Lauther, Chas. Hunter, M. L. Rowe, G. T. Garside, H. De Hart, J. H. Fisher, E. L. Sturgis.

Henry J. Perkins Co. (Atlas Trucks).—H. A. Knox, A. L. McMurtry, A. B. Henley, F. W. Fowler, J. C. Cooper.

English Daimler Co.—E. Demar.

Frayer-Miller Motor Car Co.—F. E. Moskovics, Harry H. Knepper, Oscar Lear, Lee Frayer, Tom Roe.

Ford Motor Co.—Henry Ford, J. Cousins, L. C. Block, A. M. Robbins, Chas. E. Fay, Gaston Plantiff, L. E. Hoffman, L. H. Hall, E. R. Stearns, H. Howell, John S. Gray, John F. Dodge, H. H. Rackham.

Grout Bros. Automobile Co.—W. J. Gould, C. L. Gray, W. S. Saunders, W. F. Adams.

E. B. Gallaher (Brasier).—Harold T. Birnie, L. E. Tripler, R. H. Weaver, A. D. Chadbourne.

Hendee Mfg. Co.—G. W. Sherman, F. A. Baker, F. B. Widmayer, Amos Shirley, G. Piper, F. Conner.

Iroquois Iron Works (Auto Stage).—G. Middleton.

Iroquois Motor Car Co.—C. E. McGraw, John Leggett, H. M. Glen.

Johnson Auto Carriage Co.—Warren S. Johnson, J. C. Spaulding, B. H. Cuyler.

Johnson Service Co.—J. C. Spaulding, Prof. W. S. Johnson, D. H. Cuyler.

Jackson Automobile Co.—Ed. H. Barnum, L. C. Howard, S. R. Snook, Edward Diebel, Chas W. Oathout.

The Lansden Co.—J. M. Lansden, Charles S. Schutter, Louis Ruprecht.

Lozier Motor Co.—C. A. Emise, F. C. Chandler, W. S. Mead, S. Reger, H. A. Lozier, Jr., E. R. Lozier.

Hotchkiss Archer & Co. (De Leon).—A. A. Archer, M. Canaux.

Lane Motor Vehicle Co.—George Lane, Samuel Lane, W. G. Richardson, Harold Wright, F. Schussler, H. C. Spratley.

Logan Construction Co.—B. A. Gramm, B. W. Twyman, Fred Biszantz, Carl Probst.

Maxwell-Briscoe Motor Co.—Benj. Briscoe, J. D. Maxwell, C. W. Kelsey, A. Grant, Colonel Pardee, A. Le Vino, C. G. Bleasdale, Mr. Morrison, Mr. Tyler.

Ardsley Motor Car Co.—F. R. Fuller, E. B. Blakeley, H. M. Wise.

Mors Automobile Co.—E. Lillie, A. L. Bennett, Edward Shotwell.

Moon Motor Car Co.—J. W. Moon, E. J. Moon.

Mitchell Motor Car Co.—C. P. Skinner, W. D. Brown, G. B. Rodgers, H. C. Williams, A. H. Sower, W. M. Jenkins, J. S. Griffith.

Dayton Motor Car Co. (Stoddard-Dayton).—Harry Croninger, C. G. Stoddard, J. H. Edwards, T. P. Rockett, James McIlvroid, James Larkin.

Mendel, Dale & Co. (Upton).—C. Upton, F. P. Upton, H. Mendel.

Moline Automobile Co.—E. W. Nicholson, Geo. Robertson, William Robertson, C. H. Van Dervoort.

Napier Motor Co. of America.—Walter H. Woods, Fred L. Woods, Wm. H. Hilliard, Henry Seymour, Otto B. Cole, P. T. French.

National Motor Vehicle Co.—A. C. Newby, George M. Dickson, W. G. Wall, Henry Hicks, C. H. Tyler.

Nordyke & Marmon Co. (Marmon).—H. C. Marmon, W. C. Marmon, H. H. Rice, R. J. Irvin, George Bott.

Premier Motor Mfg. Co.—H. O. Smith, R. I. Eads, S. H. Baker, W. A. Lutz, Alfred Comacho.

Palais de L'Automobile.—H. C. Neubauer, R. K. Haines, S. Suskind.

Pungs-Finch.—E. B. Finch, Mr. Porter.

Pittsburgh Motor Vehicle Co.—Chas A. Ward, Joseph Speidel

Palmer & Christie (Martini).—James Christie, A. T. Emery, Charles Palmer.

The Rainier Co.—J. T. Rainier, P. N. Lineberg, A. E. Morrison, A. E. Adams, E. A. Cordner, W. A. Lesser, A. N. Haines, H. U. Kibbe.

Rauch & Lang Carriage Co.—C. E. J. Lang, E. J. Lang, D. C. Cookingham.

Renault Freres Agency.—C. A. Tileston, M. G. Bernin, H. B. Miller, B. G. Wegman.

Rapid Motor Vehicle Co.—J. Baker, M. Hinckley, H. G. Hamilton, Max Grabowsky, A. G. North, C. M. Case.

St. Louis Motor Car Co.—Jesse French, Jr., T. B. Van Alstine, J. T. Rumble, J. Egan.

Viqueot Co.—Chas. Rainier, J. Caswell.

Westinghouse Companies.—Jules Neher, Mr. Heinrichs, Mr. O'Shea, E. S. Downs, Mr. Hubbard.

Welch Motor Car Co.—A. R. Welch, Fred Welch, H. M. Ambler, G. M. Dudley, A. E. Mills, G. H. Lighthall, L. H. Kent.

White Sewing Machine Co.—Carl Page, J. R. Parker, Harry Esselstyne, Harry Unwin, Max R. Greene, J. W. Ball, J. W. Warren, A. C. Keene, J. H. Parsons, Ray Darling, W. P. Frost, B. F. Adams.

Werner Car Improvements Co.—Oscar Werner, H. H. Cobe.

Windsor Automobile Co.—J. A. Windsor, Jr.

Wayne Automobile Co.—Roger J. Sullivan, Jesse Draper, A. L. Kull, J. H. McCarthy, George H. Lowe, George C. Lewis, W. M. Lewis, H. Wright, George A. Fisher.

York Motor Co. (Pullman).—James A. Kline, Robt. P. Morton, F. H. Kelley, A. P. Broomwell.

Züst Automobiles (Italy).—V. P. Pisani, E. B. Wilson.

A drop of oil on a bearing is worth more than a hundred drops spread over the outside of the machine.

News Notes of the Shows.

E. V. Hartford, president of the Hartford Suspension Company, who arrived from Europe on Thursday last, brought with him the signed contract which secured for him, for a term of years, the sole American selling agency for the Gobron-Brillié cars. A car of this make, it will be remembered, held the world's kilometer record for nearly two years after its makers abandoned speed contests. The Gobron-Brillié differs materially from other cars in having a four-cylinder motor with two pistons in each cylinder. The explosion occurs in the center of the cylinder, one piston moving up and the other down. The Gobron-Brillé patents have eight years to run. Mr. Hartford brought home a 35-horsepower touring car, which was used for demonstrating during the show.

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It was officially stated on Thursday by the management of the Garden show that the foreign cars exhibited there (which are those imported under Selden license) represented makes constituting a little more than 82 per cent. of the total importation during 1905. This statement is based upon the Custom House records, which show the 947 gasoline cars entered the port of New York during the year. All but 200 of these cars were of the licensed makers.

* * *

One of the gossipy subjects during the show week was the much-abused topic of trade papers. Many a promoter with a "long-felt want" up his sleeve was moved to furnish publicity projects which were

AN UNDIGNIFIED DEPARTURE—THE HORSE GETS HIS INNINGS AFTER THE AUTOMOBILE SHOW HAS CLOSED.

seemingly irresistible. The fever this year assumed the form of "specialized specialties" rather than general propositions, which seems to indicate that the established papers covering the industry are receiving proper recognition. But the specialized specialty ranging from a publication dealing with tires to one devoted to the long-suffering commercial vehicle presents the essence of specialized journalism. Next year at this rate we shall have offered separate journals for electric trucks, six-ton motor trucks, parcel delivery vans, and passenger vehicles, with a promising future for a carbureter publication and one devoted to cranks.

* * *

The luncheons given by the Maxwell Briscoe Motor Company to visiting agents and guests at the Café Martin were largely attended and attracted much notice. The placing of a Maxwell runabout on a platform at a second-story window of the café caused the Fifth avenue pedestrians and the occupants of vehicles on that thoroughfare to stare in amazement.

A MAXWALL RUNABOUT UP IN THE AIR.

An unfortunate who was trying to find out which was the "best automobile" wandered into a salesroom, where the manager forgot all about the magnificent qualities of his own machine in making a masterly and damning criticism of a competitor's car. The would-be purchaser made up his mind that a car that took so much knocking down must be a pretty good one, and promptly bought one. It proved to be a good car. Fact.

Meeting of the A. A. A.

There was a large attendance at the meeting of A. A. A. members in the rooms of the Automobile Club of America at the Armory on Wednesday afternoon. President Elliott C. Lee was in the chair. The principal address of the day was made by Winthrop E. Scarritt, former president of the association. In the course of his remarks he called attention of his hearers to two matters which he said were of vital interest to automobilists everywhere. These were the decreasing supply of gasoline and the growing tendency on the part of legislators to accomplish by indirection what they cannot legally do directly; that is, to drive automobilists off the highway by imposing upon them an onerous and burdensome tax, the claim being made that the automobile tire fittings wear out the highway.

"There are in use in America approximately 70,000 motor cars," said Mr. Scarritt. "These do not consume as much as the 800,000 gasoline stoves which are in use all over the Middle West, where fuel is always high. During the past five years the price of gasoline has doubled. The California and Texas oils are practically barren of gasoline distillates, and while the supply of gasoline is not growing, its consumption is rapidly increasing. What is our remedy for this threatening situation? It lies in the direction of vegetable alcohol. At present the United States Government taxes all alcohol $2.00 per gallon. There is no reason why this tax should not be removed on denaturized alcohol; that is, alcohol rendered unfit for drinking. Experiments with this fuel made in France, and also in America, by Prof. Elihu Thompson, show that it may be used as a motor fuel successfully. Germany last year used over 70,000,000 gallons of denaturized vegetable alcohol.

"Its general use in this country would furnish a market for the farmer's surplus corn, apples, beets, potatoes, etc. A bushel of corn will make two and a half gallons of alcohol. The surplus of this year's crop over the average corn crop would produce 700,000,000 gallons of alcohol that could be sold at a profit at the present price of gasoline.

"A bill is soon to be introduced in Congress removing the tax on vegetable alcohol. This association, and automobilists everywhere, should unite with the public press in demanding the enactment of this most desirable measure."

Other addresses were made by Judge William H. Hotchkiss, president of the New York State Automobile Association; Sidney S. Gorham, president of the Illinois State Automobile Association; A. R. Pardington, ex-chairman of the A. A. A. Racing Board; Augustus Post, chairman of the Touring Committee; John P. Coughlin, president of the Worcester Automobile Club; Windsor T. White, of the Cleveland Automobile Club, and Emerson Brooks, who gave some details concerning the proposed speedway at Pennington, N. J.

The meeting decided to have a technical committee of the association investigate and report upon means for alleviating the dust nuisance. The necessity of signboards was discussed, and the A. A. A. placed itself on record as discountenancing the use of searchlights in city and town except when absolutely required.

N. A. A. M. Annual Meeting.

The National Association of Automobile Manufacturers, Inc., held its sixth annual meeting on Wednesday afternoon at the Victoria Hotel. There were twenty-eight active members present. President Cutler's report showed that the affairs of the association are in excellent condition, and that the industry generally shows a marked advance over last year, with even better prospects for the future for those concerns which are conducted on sound business principles. The report of Treasurer Innis indicated a balance of more than $30,000, as compared with a surplus last year of but $10,000—this despite the fact that the association had contributed liberally during the year to road improvement and legislative funds.

All the retiring members of the Executive Committee, with one exception, were re-elected, E. R. Thomas succeeding Marcus I. Brock, whose retirement from active work in the trade rendered him ineligible. The hold-overs are Windsor T. White, W. R. Innis, A. L. Pope and C. C. Hildebrand.

The present officers were unanimously re-elected, as follows: E. H. Cutler, president; C. W. Bennett, first vice-president; A. L. Pope, second vice-president; S. D. Waldon, third vice-president; W. R. Innis, treasurer; Percy Owen, secretary, and S. A. Miles, general manager. The next meeting of the association will be held in the First Regiment Armory, Chicago, during the week of the automobile show there.

Dealers Deny Rumors.

Rumors were afloat throughout last week during the shows that the National Automobile Dealers' Association in annual session at the Victoria Hotel, contemplated seceding from the A. L. A. M. on the ground, in part, that the agreement to handle none but licensed cars worked a hardship to many of its members.

A dealer who handles a car made under the Selden patent is deprived of that agency should he accept the agency for a machine made by an unlicensed manufacturer, and this, so the story ran, was the crux of the proposed revolt.

President Smith, of the dealers' organization, assured a representative of THE AUTOMOBILE that no such action was contemplated. There were, he admitted, some few cases of individual dissatisfaction over the blacklisting agreement of the licensed

makers, but the large majority of the dealers was perfectly satisfied with present conditions in that respect.

President Smith and others of the officials denounced the treatment accorded them by the Garden show management in the matter of admissions, not alone for their employees, but for themselves. Many of these dealers had brought men with them—in many cases from distant cities—to familiarize them with the cars they are to handle during the coming season. But absolutely no arrangement had been made for the admission of these employees—even on a reduced-rate basis. Many of the dealers themselves, had to undergo the slow process of waiting for the raveling of a complicated red-tape system before they secured their credentials, unless they preferred to pay for their admissions—which many of them did.

SPEEDWAY TALK AT SHOWS.

A meeting of the promoters of the proposed Pennington, N. J., speedway, at the Armory on Thursday morning, took the form of a general discussion of the project preparatory to the inauguration of actual work. George W. Young, donor of the Corinthian cup to be contested for at Ormond, was announced as the latest convert to the scheme, in which racing men and manufacturers are beginning to take an interest. According to present plans, about five miles of the proposed course will parallel the Pennsylvania railroad, which would indicate the possibility in the not distant future of some exciting brushes between locomotives and automobiles.

A special speedway proposed, about which much has been heard during the week, was the National Automobile Speedway, which it is proposed to build near Barnegat, N. J. This track is to be thirty miles long, including a five-mile straightaway, all to be laid out on a tract of 6,000 acres. The plans include the building of a modern clubhouse and garage. Barnegat Bay, close by, will provide a natural auto-boat racing course. It is said that the $300,000 necessary to carry this project to completion has been practically subscribed. The location of this speedway, near Lakewood, and within easy driving distance of New York and Philadelphia, will, it is believed, add to its popularity. Among the projectors are mentioned John W. Gates, John A. Drake and Charles C. Gates, of New York; G. Jason Waters, George P. Rogers and James Elverson, Jr., of Philadelphia; O. A. Turner, A. M. Bowling and William P. Whyte, Jr., of Baltimore, and Walter E. Edge, president of the Atlantic City Automobile Club.

Prospective Purchaser—"Why don't you fit make-and-break ignition to your cars?"

Brilliant Salesman—"Because, sir, everything about our car is absolutely unbreakable, including the ignition."

Canadian Route from Detroit to Niagara Falls.

DETROIT, MICH., Dec. 30.—Despite the fact that we are now lingering in the lap of winter, and snowdrifts are supposed to abound, there are many automobilists whose ardor will not be cooled and who still venture forth to explore new routes or traverse again those around which cluster pleasant memories of summer days.

A tour that has sprung into popularity among western automobilists during the fall and open winter is the journey from Detroit through Canada to Niagara Falls. The Canadian roads are generally good, and unless unusual weather conditions prevail, this trip does not offer the difficulties encountered on the muddy roads of the States. The bit of heavy pulling promised only serves to arouse the spirit of the autoist who wants to try out his car. The winter scenery along the route is well worth the journey, while the experiences along the way are always interesting.

The Canadians have invented a few terms of their own to apply to automobiles, and these appeal forcibly to the sense of humor when heard for the first time. President Edwin S. George, of the Automobile Club of Detroit, tells of one stop he made near London, where the usual crowd of ruralists gathered around to inspect and offer suggestions. One youth, desiring to impart information while he attended to his self-imposed duties of handing out monkey-wrenches and other tools as required, thus delivered himself:

"There's lots of billyin' by here now. My sister went a-billyin' last week with a feller, and she liked it lots. Dad says they are goin' to try to stop the gases goin' down this road. It scares the works [work horses]. Want me to go and get him to bring his works down here to see your billy?"

When a citizen of the United States crosses the Detroit river into Canada to make the journey to Niagara, it is first necessary for him to file a bond with the customs officer to insure the customs department against the selling of the car after it enters Canada. President George, of the Automobile Club of Detroit, is always glad to help the tourist over this "bump" of the trip, and he will quickly arrange matters when requested to do so.

The best route from Detroit to Niagara, which has been tried by President George and other members of the local club, is here given, stripped of useless verbiage so that it can be followed without difficulty.

After crossing the ferry at Detroit, the start is made on Glengarry avenue. Windsor, southeast, which follow for about eight miles. At cross roads, after crossing a six-foot bridge at corner of cross roads, turn left and follow road into Essex.

Leaving Essex, continue on Talbot road, following curves in road to end (grocery directly in front and blacksmith shop on the left). Turn left about 150 yards to first road leading to right. Take this road and continue on it about 4 miles, crossing Michigan Central Railroad; about 40 rods further take first road to right and go straight ahead into Leamington, thence to Wheatley. Two miles beyond Wheatley turn right, go 3-4 mile, turn left (east) and follow road along the lake through Rooney, Dalton, Cedar Springs. Leave the lake here and continue on same road to Blenheim. Straight ahead over Main street, 1 mile from town turn left, pass cemetery and follow this road north 1-2 mile. Turn right just before crossing railroad track and follow road straight into Ridgetown—80 miles.

Continue straight ahead (east) 3 miles to end of road, turn left (north), cross two railroad tracks. At first road turn right (east) through Highgate, and at first road beyond Highgate turn left on the Muirkirk road to end of road; turn right (east) 1 mile, turn left, passing church on left, another mile to schoolhouse. Here turn right and continue about two miles to the town line road; turn left and follow road, crossing Thames river.

A the first road—the Longwood road—turn right and follow straight through the towns of Wardsville, Newberry, Glencoe, Kokomo, Lenberth to London—140 miles from Detroit. The last 60 miles is a direct drive over superb roads.

Leave London over Dundas street to Thanesford. Here the odometer should register 156 miles. Just before passing through Thanesford, cross stream, and at foot of hill turn right and follow road direct to Ingersoll. Enter this town at right angle to Main street. Turn right on Main street and go one block beyond Atlantic Hotel; turn left and follow road straight into main street of Woodstock—170 miles.

Continue east over Main street about four miles to forks. Hake right fork straight ahead through Cathcart, Burford and Mt. Vernon, crossing iron bridge over river to Main street of Brentford. Leaving Brentford, follow Colborn street east, along telephone line through Cainsville, Lanford, Alberton and Ancestor. Continue on same road (watch for bad curves) about seven miles, entering on King street into Hamilton—218 miles.

Follow King street 7 or 8 blocks, turn right 1 block to Main street, turn left and continue with curve to the right at a fork just out of Hamilton, then on to Stony Creek, Winona, Grimsby, Beansville and Jordon, which consists of a hotel and blacksmith shop. At the top of the hill in Jordon keep to the right direct into St. Catherines.

Leaving St. Catherines, go out St. Paul street to Queenstown street; follow this street through Homer to St. David. Here turn right at grocery and follow this road with its curves into the town of Niagara Falls. Go to the upper bridge to cross to the American side.

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Growth of Trade in Sundries. A survey of the accessories exhibited at the shows provides a convincing proof of the magnitude to which an entirely dependent trade may grow. The *raison d'être* of the sundry business being the automobile, it is interesting to consider the development of this allied trade. In the first place, a great number of the concerns now engaged in the manufacture of such articles as are broadly classed under the head of sundries are by no means new in the world of trade, and a number have been long established as producers of standard articles of commerce. This is particularly true in the case of the manufacturers of tires and electrical goods, but here the broadening effect of the automobile is seen in the adaptation of the product to the new use and widening field.

For example, a few years ago it was scarcely possible to purchase in the open market an American made induction coil of anything but the crudest finish, with perhaps high efficiency, but not fitted for attachment to the well-finished automobile. This condition has been changed and there are now a number of concerns of the best standing making coils and other ignition specialties of the highest finish and efficiency.

The quality of tires has also been vastly improved and the output has increased to such a marked degree that the pioneers in the business can no longer take care of the demand. This matter of demand has had much to do with the entry into the business of such a great number of manufacturers of accessories, the buying public requiring no great campaign of education and the dependency of the sundry business on the automobile industry being exemplified by the prosperity that marks the allied trade.

The total floor space occupied for the exhibition of sundries at the New York shows was nearly as great as that which was given over to complete vehicles, and of the total number of exhibitors more than one-half were the accessory and materials concerns. In a considerable number of instances sundries are entirely new articles rather than adaptations, though such things as tops, tires, batteries, coils and upholstery are logical developments and refinements of previous products of houses of long standing.

The horn, chime alarm, acetylene lamp, shock absorber and other small necessities have been devised solely to fit into the scheme of the automobile and, except in some crude and embryonic forms, would otherwise never have appeared, and certainly not in commercial quantities. The same thing may be said of such measuring instruments as the speed, distance and grade meter.

While the amount of capital directly invested in the business of manufacturing sundries is not so great as the total investment of the builders of cars, it is such a considerable sum that the stability of this branch of the industry is assured, while its growth is indicated by the great increase of interest on the part of visitors at the shows.

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Prepaying Foreign Postage. Concerns which have an established foreign trade know the importance of properly prepaying all matter sent by mail, including, of course, correspondence. Many foreign business houses refuse all underpaid mail matter with the result that the American correspondent suffers a loss of orders or creates a prejudice against his business methods. In most European countries the value of small things is very thoroughly appreciated, and houses of the first importance will take offense at matters involving expenditures on their part that an American house, under similar circumstances, would not bother about. In most, if not all, European countries the postal authorities impose a penalty of double the difference between the postage on an underpaid letter or package and the actual postage which should have been prepaid. In a house transacting an extensive foreign business the aggregate payments of penalty postage would foot up a considerable sum in a year.

The subject is discussed in a letter by U. S. Consul Creerey, of Glauchau, Germany, who says:

"It is particularly annoying to have to pay penalty postage on business letters, letters asking favors, or advertising matter. That this is often the result of carelessness or stupidity of a mailing clerk is illustrated by two letters received at this consulate from a responsible American firm recently. One reads: 'We wrote you fully this morning, but regret that the letter should have been mailed by one of our clerks without proper postage.' The letter referred to was sent under a 2-cent stamp and cost 25 pfennigs (6 cents) penalty postage. The letter apologizing for the carelessness had no stamp and cost 65 pfennigs (16 cents). All letters for foreign countries should be carefully weighed and particular attention paid to the postage."

Many times the error is caused by failing to remember that while the minimum domestic rate for letters is two cents for *one* ounce, the lowest foreign rate is five cents for *one-half* ounce. The matter of postage is well worth the attention of firms trying to build up a foreign trade.

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Correct Nomenclature Needed. In the discussion of the automobile, either through the medium of the press or in everyday conversation, on the street or in the shop, the need of a correct and uniform nomenclature for the various parts and functions of the self-propelled vehicle becomes each day more apparent.

The use of the word "automobile" has been accepted so generally that any objection to its continuance can only be from the viewpoint of the etymologist. In great Britain the automobile is called a "motor-car"—not a bad name, but less pleasing to the ear and of no esthetic quality. Here at home we use the word "car" as a popular and short word, and specifically as meaning an automobile designed as a pleasure vehicle.

The need is not so much a name for the automobile as a correct and uniform designation of the component parts and accessories. The French language has furnished us with a number of terms which by reason of long continued use seem to admirably answer the purpose. The adoption of these French words is a logical outcome of the earlier period in the industry in America when the importation of cars formed a considerable proportion of the source of supply.

In a general way the rapid growth of the automobile industry in this country is responsible for confusion in nomenclature, the wide interest of the public in the subject provoking discussion not always along lines of conservatism and understanding. However, the introduction into our vocabulary of some dozen odd words of French origin need not be followed by their misuse. As an example, the word *mechanicien* might be noted. The Anglicized form, "mechanician," is used in the majority of cases incorrectly as synonymous with "mechanic." The automobile "mechanician" is rarely skilled in the

"theory and construction of machines," and the use of the word is misleading unless used with this understanding.

In the case of words which have long been a part of our own language a mistake is less excusable. For instance, "commutator" is commonly used, and by many competent men, to mean the make-and-break device upon which the correct timing of the motor depends. The function of this device is neither more nor less than that of a switch, mechanically actuated in such a manner that the switch is closed and opened at the correct moment when it is desired to cause combustion in the motor cylinder. Undoubtedly the intent is fairly plain when anyone speaks of the "commutator," but a commutator is a mechanism designed for altogether different purposes than the mere completion or interruption of an electrical circuit.

Indefiniteness marks the use of a number of terms, as, for instance, "steering wheel." At the very least this may mean any one of three wheels, and in the case of certain types any one of five wheels. "Radiator" is usually meant when "cooler" is used, and possesses a much more specific meaning. "Chassis" should be used in the same sense as the French understand the word, and since we have borrowed the term we should apply it to the same object, namely, the completed mechanism, frame, wheels, motor, change-speed and all the assembled parts of the automobile except the body.

What we need in the way of nomenclature is some recognized authority. A system once adopted would be easy of assimilation by the trade and the press, and its use by the public would follow, so that uniformity would soon be reached. The only possible solution of the problem is the action of some such body as the Society of Automobile Engineers, an organization eminently fitted to issue a complete nomenclature of the automobile, its parts and functions, and it is hoped that the members of that association will see fit to take early steps toward this end.

INDIANAPOLIS WANTS A COLISEUM.

INDIANAPOLIS, Jan. 20.—Automobile manufacturers, dealers and drivers of this city are lending their support to a movement to erect a coliseum in Indianapolis which will be large enough to accommodate an automobile show. The project is still in infancy. The growth of Indiana factories and their constantly increasing production are forcing Indiana to the front as a producer of autos, but, despite this fact and that Indiana is so centrally located, her manufacturers are compelled to go to other cities in order to display their cars in a satisfactory manner.

It is planned that the coliseum shall have a seating capacity of 15,000 persons, and it is expected that it will cost in the neighborhood of $750,000. Of this amount it seems likely that a large portion of it will be raised by automobile interests.

Great Assemblage at A. C. A. Banquet.

SIX hundred members of the Automobile Club of America attended the club's annual dinner held at the Waldorf-Astoria, New York, on the evening of Saturday, January 20, the last day of the most successful automobile show ever promoted by the club. The great ballroom was magnificently decorated with flowers, ferns, palms and evergreens, the pillars and most of the walls being hidden by masses of color and foliage; on the tables were stands of American Beauty roses and decorations of Southern smilax. The galleries of the ballroom were filled with ladies, friends of club members and those who had been unable to secure seats at the tables; the handsomely gowned ladies and the beautiful floral decorations of the gallery fronts added greatly to the brilliancy of the scene. The guests at the A. C. A. dinners are always presented with a souvenir or momento of the occasion; this time a seal cardcase was given to each member, with the recipient's name stamped in gold letters; in the case was a little card bearing the menu, which was as follows:

MENU

Buffet Russe

Oranges de Floride avec
Rocher Frères Orange Curaçao

Tortue Verte claire

Radis Pim-olas Céleri vert
Amandes salées
Noix marinés

Coquilles de Flétan

Couronne de Ris de Veau
aux champignons frais

Filet d'Agneau, Sauce Tyrollienne
Petits pois sautés
Piments verts farcis

Sorbet de Fantaisie

Terrapène à la Philadelphie

Canard Canvasback Rôti
Hominy frit Gelée de groseilles

Salade de fruits

Glaces Assorties
Petits fours Noix et Raisins

Café

Conocedor Amontillado Sherry
G. H. Mumm & Co.'s Selected Brut
Ayala Magnet, Extra Dry
Apollinaris
Dewar's White Label Scotch
Dawson's Old Curio Scotch
1824 Brandy, A. C. Meukow & Co.
Cordials
Cigars (Waldorf-Astoria Cigar Co.)
Pall Mall Cigarettes

Another pretty feature of the dinner was that the ices were served in *papier maché* automobiles, searchlights, airships, and other mechanical forms—the airships being especially appropriate in view of the presence of members of the affiliated Aero Club of America.

The president of the A. C. A., Dave Hennen Morris, was toastmaster. On his right sat Prof. Alexander Graham Bell and on his left John Jacob Astor. The other guests at the president's table were Henry M. Duncan, Jefferson Seligman, Henry C. Rouse, Colgate Hoyt, Milton J. Budlong, Samuel H. Valentine, Henry D. Estabrook, William H. McElroy, Gen. George Moore Smith, Winthrop E. Scarritt and John Brisben Walker.

President Morris, as toastmaster, referred in his opening remarks to the interest taken by foreign government officials in road racing and expressed the opinion that the same course might be followed in this country with advantage to the automobile movement. Professor Bell, speaking on behalf of the airship movement, referred at some length to the problem of aerial navigation, stating that he believed the airship would be rapidly developed on both sides of the Atlantic simultaneously. Professor Bell believes that the solution of the problem will take the form of an aeroplane propelled by a light but powerful motor.

The speeches which followed were, for the most part, disappointing to those who expected to hear interesting and valuable discussions on matters of interest in connection with automobilism, and were more in the nature of after-dinner inanities than serious utterances intended to be of permanent interest.

Among those present at the dinner were the following:

David W. Abercrombie, Dr. C. T. Adams, C. C. Adams, Albens T. Adams, George B. Adams, C. L. Addison, Louis R. Alberger, A. H. Alker, Capt. F. M. Alger, Russell A. Alger, Jr., J. D. Anderson, Maj. James M. Andrews, James S. Anthony, Frank C. Armstrong, Theodore P. Artaud, Albert Ashforth, J. W. Aylesworth.

Don H. Bacon, Louis P. Bach, S. H. Baer, A. C. Banta, Julian H. Barclay, A. L. Barber, A. Victor Barnes, William Barbour, E. E. Bartlett, C. W. Barron, Dana P. Bartlett, Charles D. Barney, Col. Allan C. Bakewell, J. W. Ball, Frank H. Ball, William N. Beach, W. G. Bee, E. M. Belding, M. M. Belding, Jr., W. S. Belding, A. J. Belden, Frank Bell, Charles J. Betzig, Cortlandt F. Bishop, Gustav Bissing, Ph.D., E. T. Birdsall, George M. Bingham, Luther L. Blake, K. M. Blake, Bron, Samuel Brill, W. G. Brooks, J. F. Booth, Charlton P. Brooke, Emerson Brooks, Philip J. Britt, Curtis P. Brady, G. J. Bradley, James C. Brady, Daniel M. Brady, H. H. Brady, Jr., Herbert P. Brown, Grant Hugh Brown, Samuel Brill, W. G. Brooks, J. F. Brice, George T. Brokaw, Nicholas F. Brady, James Brown, Stephen H. Brown, John T. Brush, Benjamin Briscoe, William H. Browning, George P. Butler, William H. Butler, Winslow E. Busby, Dr. J. A. Bullard, William W. Burke, J. S. Bunting, L. B. Butler, S. M. Butler.

John A. Caldwell, Hon. John F. Carroll, Herbert S. Carpenter, Eugene J. Cantin, John Calder, W. M. Campbell, Jess Cassard, Louis Cassier, J. Hayes Carstairs, Charles Carstairs, George F. Chamberlin, A. H. Chadbourne, W. E. Chipman, Frank Chipman, A. W. Church, K. O. Chisholm, Alfred N. Chandler, H. Durant Cheever, John Clark, George Clarke, Dr. G. D. Cochran, Kenyon B. Conger, W. E. Corey, W. L. Colt, George M. Cohen, E. J. Corbett, M. R. Connell,

Maurice Coster, Norman P. Cooley, David Crutchfield, Henry C. Cryder, Dr. D. Le Roy Culver.

George H. Day, W. W. Darley, C. L. Dane, Edward T. Davis, S. T. Davis, Jr., Dr. F. M. Dearborn, L. C. Dessar, J. E. DeMar, W. D. Denegre, J. W. de Aguero, L. C. de Coppet, A. de Magnin, J. Henry Dick, J. H. Dickinson, Philip T. Dodge, Perry H. Dow, H. F. Donaldson, Dr. L. F. Donohue, M. V. Doud, Burton Dowling, Frederic S. Doremus, F. E. Drake, Capt. F. R. Drake, C. A. Duerr, Thomas C. Dunham, Col. P. S. Dyer, Richard N. Dyer, Jos. Dykes.

A. W. Eager, Hayden Eames, Henry Edmunds, William C. L. Eglin, Alfred Ely, William D. Ellis, John Elliot, James Elverson, Jr., L. W. England, A. L. Erlanger, Charles E. Etheridge, Mark S. Eustace, Frank Eveland, H. J. Everall.

Ernesto G. Fabbri, E. A. Fairchild, James F. Fargo, C. E. Farnsworth, George H. Fearons, Murray W. Ferris, E. H. Fitch, Ezra H. Fitch, Ernest Flagg, William M. Fleitmann, Frederick T. Fleitmann, George H. Flinn, F. S. Flower, N. M. Flower, Peter Fogarty, Eugene A. Fornes, Julius K. French, Arthur Frowein, Mortimer B. Fuller.

Frank S. Gannon, David H. Gaines, T. J. Gaines, Jr., E. B. Gallaher, R. D. Garden, Andrew L. Gardiner, A. L. Garford, Francis P. Garvan, William D. Gash, Charles G. Gates, John W. Gates, Harry George, C. H. Gillette, W. E. Gilmore, Henry Ginnel, W. S. Ginnel, J. W. Gilson, Frederick Glassup, Frederick Glassup (guest), W. C. Gotshall, C. A. Godshalk, H. A. Grant, Edward Graves, Olin D. Gray, Andrew Gray, Max R. Greene, Warwick Greene, V. R. Greene, R. A. Greene, T. L. Greenough, W. A. Griffith, V. M. Gunderson.

Clarence M. Hamilton, J. T. Harwood, John Hall, P. C. Hale, William Hawley, Alan R. Hawley, J. F. Hart, J. Horace Harding, Chares E. Hadley, John F. Havemeyer, J. G. Haeslett, James M. Hartshorne. George F. Harriman, Howard S. Hart, Maxwell S. Hart, C. A. Hanna, Frank Hedley, Capt. Homer W. Hedge, E. H. Heinrichs, A. P. Heinze, E. J. Heppenheimer, Gen. W. C. Heppenheimer, A. P. Hexamer, G. F. Heublein, A. B. Henley, W. C. Heydecker, W. S. Hilles, W. A. Holton, George C. Hollister, E. Rand Hollander, L. J. Holton, James Hopkins, A. C. Hottenroth, Frederick W. Hottenroth, Walter B. Horn, Walter L. Horn, A. H. Hopping, Gen. G. E. P. Howard, David Huyler, Archer M. Huntington, Archer M. Huntington (guest), W. B. Huriburt, George B. Hutton.

Richard Irwin, Felix Isman.

Robert Jardine, Charles M. Jarvis, H. L. Jones, M. B. Johnson, Walter Howard Johnson, Ormond Lawson Johnston, Henry B. Joy.

G. Kauffman, W. W. Kelchner, Hon. James E. Kerr, Henry W. Kent, Richard Kennerdell, R. C. Kelsey, William P. Kennedy, George K. Kirkham, C. W. King, J. A. Kingman, Charles King, C. E. Knoblauch, F. M. Knowles, C. J. Knowles, J. G. Kugelman, Robert S. Kunkel.

E. J. Lake, John M. Lansden, Jr., William W. Lawrence, George Landers, George Landers (guest), Arthur B. Leach, G. Howland Leavitt, John J. Ledwith, Ralph C. Lewis, J. M. Leopold, George A. Legg, Frederick G. Lee, M. Le Vino, Warner M. Leeds, F. M. Lockwood, L. F. Loree, C. M. Lowther, Geo. Lowther, Harry J. Luce, Whitney Lyon.

James H. MacDonald, W. H. Malley, Winslow Mallery, Frederick Marsh, W. N. Mason, John Markle, Charles M. Manly, J. J. Mandery, Carleton Macy, Melville D. Martin, A. Massenat, V. L. Mason, J. D. Maxwell, George Ross Mackenzie, H. R. Mackenzie, A. D. MacLachlin, Rufus L. MacDuffie, J. H. MacAlman, Patrick H. McCarren, James J. McGuire, Joseph B. McCall, Ira A. McCormack, P. H. McMillan, Henry B. McQueen, George E. McQuesten, Herman A. Metz, Richard W. Meade, Henry Mehl, Walter H. Merrall, F. A. Merrall, A. E. Merrall, Leonce Messinesi, Cord Meyer, W. B. Miller, A. E. Miller, Charles E. Miller, John Miller, S. A. Mitchell, A. H. Morris, Robert Lee Morrell, J. Howard Morse, I. J. Morse, H. F. Mollenhauer, Frederick P. Morris, W. J. P. Moore, Louis P. Mooers, R. S. Munger, R. C. Munger, Dr. John P. Munn, Thomas J. Murphy William A. Murphy.

Robert Naegell, Edward C. Newcomb, Hon. T. H. Newberry, J. Neher, W. W. Niles, William P. Norton.

William W. Ogden, Dudley Olcott, John F. O'Rourke, James H. Ottley, A. H. Overman, W. C. Overman.

Orrel A. Parker, R. G. Packard, Jr., J. W. Packard, Carl Henry Page, William H. Page, Jr., E. S. Partridge, K. C. Pardee, Andrew Peters, John Pierce, Karl D. Perkins, H. B. Phinny, W. P. Phinny, W. T. Plimpton, Charles S. Phillips, N. Taylor Phillips, Percy Pierce, Conrad N. Pitcher, John F. Plummer, Jr., Augustus Post, H. T. Pond, J. M. Porter, H. W. Pratt.

Hon. Lemuel E. Quigg.

H. E. Randolph, James E. Ratchford, William Remick, Rev. Alban Richey, Isaac L. Rice, John Rice, Howard Riegle, Benjamin Riegle, A. L. Riker, W. J. Riker, J. T. Roche, Jr., A. W. Robinson, E. H. Rosenstock, Pierre Lorillard Ronalds, H. P. Robbins, Basil W. Rowe, M. J. Rothschild, J. E. Roosevelt, J. B. Russell, E. F. Russell.

William D. Sargent, Henry Sanderson, Robert P. Scott, George I. Scott, William P. Scott, Jr., Myron Schafer, George E. Schank, Charles F. Schutter, John Schlosser, Philip Schlosser, D. E. Seybel, A. D. Seymour, E. D. Shurmer, John Shepard, Jr., W. L. Shearer, Jr., Royal R. Sheldon, A. R. Shattuck, William C. Shanley, J. M. Shaw, Hon. Theodore H. Silkman, Angus Sinclair, George Singer, Arthur J. Singer, Jerome Siegel, R. W. Slusser, George J. Smith, E. E. Smathers, Charles G. Smith, R. H. Smith, Arthur T. Smith, Eugene Sondheim, Charles S. Sommerville, Charles E. Spratt, George B. Spearin, I. N. Spiegelberg, J. G. Stuart, J. M. Stoddard, Albert J. Stocker, T. W. Stemmler, Benjamin Stern, Frederick C. Stevens, Richard Stevens, S. B. Stevens, Ed. J. Steiner, H. S. Sternberger, Alix W. Stanley, Herbert Strong, J. S. Sturgis, F. C. Sutro, H. R. Sutphen, H. M. Swetland, George E. Sykes.

Albert Taylor, Samuel Walter Taylor, B. L. Taylor, H. R. Taylor, Gage E. Tarbell, Edward A. Taft, George P. Tangemann, C. C. Tegethoff, W. C. Temple, William S. Teel, Jr., General Thayer, William Thaw, William Thaw (guest), Thomas H. Thomas, T. E. Tomlinson, J. de Mont Thompson.

Hermann Unger.

Hon. Robert A. Van Wyck, D. L. Van Nostrand, Philip Van Volkenburgh, William Van Anden, B. C. Van Dyke, F. I. Vander Beek, M. J. Verdery, Atwood Violett, Rev. Wm. H. Vibbert, H. H. Vreeland.

S. D. Waldron, R. H. Wallace, Walter T. Wallace, W. R. Warren, Dr. W. S. Washington, G. Jason Waters, Francis A. Watson, H. R. C. Watson, R. H. Weaver, Gustav Weinberg, J. J. Welch, C. W. Wells, Henry F. Wells, Edward Weston, Edward F. Weston, C. F. Wetzel, J. G. White, Dr. Schuyler Skaats Wheeler, A. G. Wheeler, H. C. Whitman, Clarence Whitman, A. H. Whiting, W. McC. White, R. D. Willard, John A. Wilson, Winslow Tracy Williams, Frank L. Wing, Arnold Wood, A. D. Wood, O. J. Woodward, Hon. R. S. Woodruff, E. B. Wright, C. F. Wyckoff.

C. S. Yeagle.

Clean glass in a lamp makes far more difference in the strength of the light projected than most people suppose.

ROADS EXPERIMENTING.

Alton and Burlington Trying Motor Car While Illionis Central Looks on.

CHICAGO, Jan. 22.—Several of the railroads which have suburban service in and about Chicago have become deeply interested in the subject of gasoline motor passenger cars, and two or three have been experimenting of late along this line. The Chicago & Alton tried out a car which gave satisfactory results at first, but which did not meet with every requirement after the first trial. The company has not lost its confidence, however, and believes that railroad cars driven by gasoline engines have a bright future in suburban service, which requires high speed for short distances and quick stopping and starting.

The Chicago, Burlington & Quincy railroad is also experimenting with gasoline motors in its shops, and is endeavoring to secure a quick-starting, heavy traction car. The Illinois Central has also become interested and is watching the efforts of its rivals with a view of doing something in the same line itself, if the cars prove successful.

One feature of gasoline cars which appeals to the railroad men is the fact that the danger which is always present when an overhead trolley or third rail is used, is eliminated.

A MOTOR CAR RAILROAD.

BALTIMORE, MD., Jan. 22.—An application will be made to the present General Assembly of Maryland for a charter to operate an automobile car line between Chestertown, Kent county, Md., and Tolchester Beach, the enterprise being projected, it is said, by George R. Snodeal, of Baltimore, and several New York capitalists. It is proposed to obtain rights of way over private property, a number of such rights having already been granted.

Gasoline propelled cars, seating thirty persons, will be used on ordinary railroad tracks of sixty-pound rails. Each car will have 100 horsepower, and it is expected that a speed of thirty miles an hour will be obtained. This would reduce the time required to cover the eleven miles between the two points to a fraction over twenty minutes. At present it is nearly a two hours' drive by horse.

It is said that if the line is built it will eventually extend to other points in the northern part of the county. Kent county residents have expressed their gratification and enthusiasm over the scheme.

A pocket electric lamp is an exceedingly convenient thing to have about the car.

If the nuts on the bolts in your car are not fitted with spring washers, jam nuts, cotter-pins or some other retaining device, you will be wise to make sure that every nut will "stay put" by applying something of the sort without delay.

Stanley Steamer Goes Mile in 31 4-5 Seconds.

THE first races on the Florida beach were held on Tuesday, January 23, having been postponed from the previous day, and in the one-mile steam championship the mile record was broken by the winner, the Stanley steam car driven by Marriott, the time being 31 4-5 seconds.

The initial morning dawned with plenty of fog, rain and wind; but the weather improved somewhat as the day grew older, and by 11 o'clock had moderated sufficiently to permit a start to be made. Great enthusiasm was displayed by the visitors, who were at the beach, notwithstanding the adverse conditions. The telegraph wires leading out of Daytona were not in working order until about noon.

CORINTHIAN TROPHY FOR TEN MILE RACE DONATED BY GEORGE W. YOUNG.

The Thomas six-cylinder racing car will not be sent to the beach, and the machine is now stored at the New York garage of the Thomas company.

Immediately after the New York shows closed—and in many cases before the shows closed—people began the journey to the Florida beach. Hundreds went from New York alone, many by special trains. Guests at the dinner of the Automobile Club of America made a hasty exit after the speech-making and caught a late train for the great speedway. The people at the beach are kept on the keen edge of expectancy by the possibility—some believe the probability—of speeds equal to two miles a minute, and with plenty of fast cars, a beach in fine condition for fifteen miles and good weather the best of sport is looked for during the meet.

In practice spins the cars have shown great speed; the Stanley steam car is said to have covered a kilometer in 19 1-5 seconds, and the 90-horsepower Napier is credited with an unofficial mile in 31 seconds.

The entry list for the amateur race at 10 miles was re-opened, owing to the fact that but two entries had been received. Several new entries have been received and a good contest seems probable. The trophy offered for this race by George W. Young here illustrated is a handsome piece of art work. The Young trophy was on exhibition at the automobile show in the Armory, New York, and attracted a great deal of attention and admiration. Another beautiful trophy is the silver cup offered by the A. C. of Minneapolis, the prize for the 100-mile race. The cup, including its ebony base, stands more than three feet high and is surmounted by an American eagle with outspread wings; the value is $3,000.

The races will be timed by the McMurtry electric timing apparatus, in charge of A. L. McMurtry. The other timers will be S. M. Butler, J. W. Kerrison and Walter C. Baker.

The Minneapolis Cup.

The cup that the Minneapolis Automobile Club has offered for competition at Ormond will be known as the "Minneapolis Automobile Club Speed Trophy." With the base, which is of black ebony, it stands more than three feet high, and is valued at $3,000. On the top is an American eagle with outspread wings, while immediately below on either handle are two automobile wheels, each bearing a pair of wings. On the front side, contrasting pleasingly with the sterling silver of which the cup is made, is the club monogram emblem, "The Automobile Club of Minneapolis," in gold. Supporting the trophy are several draped figures bearing victors' wreathes, and ornamenting the base are three miniature reproductions of speeding automobiles.

The cup will be raced for in a 100-mile, straightaway event, with flying start. The trophy was carried to the tournament in the special train that the club has chartered for the Daytona trip.

Asa Paine, a prominent automobile enthusiast of Minneapolis, was recently elected president of the Florida East Coast Automobile Association, and it was in recognition of this honor to the city that the Minneapolis club decided to donate the trophy.

The rules governing competition for the cup specify that it shall be raced for at least once each year until won twice by the same party under the rules of the A. A. A., or other racing organizations given proper sanction; that the contest shall be open to all cars of weights within the heavyweight international classification of 2,204 pounds, regardless of power or country of manufacture; that the trustees shall have the right to reject any entry, to decide all matters not specifically covered by the conditions, and to change the conditions with the consent of the donor.

The board of trustees consists of the president of the A. A. A., the president of the Chicago Automobile Club, the president of the Minneapolis Automobile Club, H. L. Bowden, of Massachusetts, W. J. Morgan, of New York, C. F. Haglin, of Minneapolis, Horace Lowry, of Minneapolis, C. G. Burgoyne, Asa Paine and S. H. Gove, of Daytona, Florida.

ITINERARY OF MINNEAPOLIS SPECIAL.

MINNEAPOLIS, Jan. 22.—The itinerary of the special train of the Minneapolis Automobile Club was finally arranged last week, and affords one of the most attractive trips ever made from the Twin Cities. The party left Minneapolis on Saturday evening at 8 o'clock for Chicago, where the car was transferred to the Big Four railroad, which got them into Cincinnati at 6 o'clock Sunday evening. From Cincinnati they went over the Queen and Crescent, and should have reached Chattanooga this morning at 7 o'clock, to remain until 3 P. M. Special cars were engaged to carry them to the top of Lookout Mountain, where they were to have dinner at the Lookout Inn.

MINNEAPOLIS AUTOMOBILE CLUB SPEED TROPHY FOR 100-MILE RACE AT ORMOND, IN FLORIDA.

Leaving Chattanooga in the afternoon they will go to Atlanta and then to Jacksonville, arriving at 8.30 o'clock Tuesday morning. A stop was to be made at St. Augustine so

that they could visit the old cathedral, Fort Marion, the famous sea wall, the Casino, the Alcazar, and the Ponce de Leon. At Daytona the train will be sidetracked until Saturday evening, when the return trip will be commenced.

ORGANIZE TO BUILD.

TOLEDO, O., Jan. 20.—The Commercial Motor Truck Company, which succeeds the American Motor Truck Company of this city, has made arrangements whereby it is to locate permanently in Plymouth, Ohio. A factory, 60 by 100 feet, is being erected, which is to be ready for occupancy by April 1.

The new company is capitalized for $50,000, and the manufacture of automobile trucks is to be conducted on a fairly large scale. It is the plan of the company to increase its plant as required. It now has orders for a number of vehicles, and pending the completion of its plant in Plymouth these will be built in Toledo.

The truck which the company will make has a gasoline engine. For the present but two styles will be made, of two and five tons capacity, but at an early date the company hopes to be in a position to execute orders for trucks of various styles. Numerous satisfactory tests have been given the truck in Toledo.

Charles A. Keller, a local attorney, is president of the company although a new roster of officers is to be elected this month. A number of other Toledo men are financially interested as well as a number of residents of Plymouth.

Notwithstanding the fact that electricity is as vital to the operation of a gasoline motor, as is gasoline itself, many an automobilist knows comparatively little about electricity or of the principles which underlie his ignition apparatus. With a view to supplying the requisite information in a convenient and easily digested form, T. H. Hawley, author of "Motors in Principle and Practice" and other works of a similar character has written a volume on "Motor Ignition Appliances." In this book the author plunges directly into the practical matter in hand without burrowing into unnecessary theory, and explains what must be understood in order to gain a clear comprehension of the working of various types of ignition apparatus. Then the reader is given clear explanations of the constituent parts of the ignition systems in use and is told what they do, why they do it and how to set them going if they stop how to find troubles and how to remedy them when found. The book contains 137 pages and is illustrated by numerous line engravings and half-tones, showingthe constructional details of spark plugs, coils, vibrators, magnetos and so on. It is published by the Cycle Trade Publishing Co., of 21 Wilson street, Finsbury, London, E. C., England.

Diversions of Houston, Texas, Automobilists.

BY O. O. BALLARD.

HOUSTON, TEX., Jan. 20.—Automobiling for recreation and pleasure is actively pursued in the Texas coast country eight months in the year. Late winter and early spring constitute the dull season, the heavy rains then making the prairies marshy and the dirt roads heavy and difficult to travel, although they are excellent at other times.

By the middle of spring the Houston Automobile Club enters upon a season of activity. The majority of its sixty members are enthusiasts and take part in the many club events. An inclination is shown for unique affairs, such as racoon and opossum hunts by night; "jack rabbit" runs across the prairie, oyster roasts at remote and picturesque spots, and fishing outings along Galveston Bay. Wives, daughters and women friends always participate, and from twenty to forty machines filled with merry parties usually line up for each trip.

'Coon and 'possum hunts were very popular last season, when they were conducted in the vicinity of the Bering rice plantation. There is a fine old country house there, and it is always open to the automobile guests. A pack of hounds skilled in hunting nocturnal game is also kept at the plantation, and is at the disposal of the parties. Messrs. C. L. and Theodore Bering and Miss Jennie Bering are in the semi-roll of hosts and hostesses when the plantation house is made the rendezvous point on an evening's spin. Miss Bering is secretary of the club. A fine wood skirts the meanderings of Buffalo bayou, and passes very near the house.

If a 'coon and 'possum hunt has been prearranged, provisions for a luncheon or a feast are taken along by a party to the ranch house. The refreshments usually are of a substantial character, for the diversion of an hour or so in the woods after game is certain to stimulate an appetite.

The automobiles are left at the house and the party follow afoot the yelping hounds, which are turned loose, and enter the woods. For the double purpose of more easily penetrating the darkness, and for "shining" the eyes of the game, two or three members of the party carry headlights deatched from the automobiles. The bright rays are splendidly adapted for fire hunting.

There is very little real hunting done, although the sport is greatly enjoyed. The hounds enter into it with as much vigor as though skilled sportsmen were backing their movements. It usually requires but little time to tree a 'coon or 'possum, and the party gathers in a circle about the tree while some of the athletic young men undertake the task of shaking the game from its hiding-place among the limbs. A pair of pole climbers are always taken along, and with these strapped to the feet it is not difficult to get into the upper limbs and dislodge the animal. The dogs do the rest. There is always some game bagged, and on one of the last runs a raccoon was captured alive, but shortly after was given its freedom again.

The jack rabbit hunts are also conducted at night, and are best when there is no moon. The runs are made over the prairie.

HOUSTON AUTOMOBILISTS ON THE SHORE OF GALVESTON BAY.

DRIVING ON THE SHELL ROAD NEAR HOUSTON, TEXAS.

and the headlights and the exhausts of the machines do very effective work in routing out the game. The rabbits seem fascinated by the lights and behave most queerly, following them or running toward them instead of away.

Fishing excursions to the points along the bay take up a day's time. Morgan's Point, one of the favorite places, is reached by a twenty-five-mile run, twenty miles of which is over a fine shell pike as smooth as an asphalt pavement. These trips are most popular with a number of members of the club, who enjoy them at the end of each week during the fishing season. There are several road houses along the way at which good dinners and refreshments are to be had.

The headwaters of Brays bayou, fifteen miles from Houston, is frequently selected for oyster roasts or basket spreads in the evening. The spot is particularly picturesque by moonlight, and the Poor Farm pike leading to it is inviting for speed. If the outing is at night, huge bonfires are built, and the howling of wolves in the distance lend weird music. The oyster roasts are sometimes on an elaborate scale, and entertainment in the way of string music is provided.

Long distance runs have not been popular owing to bad roads. The Poor Farm road, fifteen miles; the Harrisburg shell pike, twenty miles; the Clark street gravel road, twenty miles, and the Main street shell and gravel pike, ten miles, constitute the principal paved highways. The dirt roads prove almost as popular during the season, and much longer runs on them can be taken.

Some of the hardier members of the club have made long-distance trips. Messrs. C. L. and Sam Bering and Captain C. E. Hays made a trip of 250 miles down the coast to Port Lavaca last summer in an Olds. The entire distance is as flat as a floor, but the trip became very irksome owing to unbridged streams and the bogginess of the prairie roads in places. Runs have been made to San Antonio, 220 miles, but they were trying. Houston to Galveston, fifty-five miles, is a rather inviting trip, and is frequently made both ways in a day, with a few hours to spend in the Island City.

The Houston Automobile Club has sixty-one members and represents about fifty out of the eighty machines in the city. D. J. Palmer is president; Miss Jennie Bering is secretary, and is said to be the only lady secretary of an automobile club in the United States. M. J. Lawson is treasurer and W. D. Byrkett is club captain and pacemaker in the different runs. The club holds a regular run each fortnight in season, but the special events are much more frequent and add greatly to the interest. The club has quarters in the establishment of the Hawkins Automobile Co.

There are two garages in the city, with a combined storage capacity of eighty machines. One is that of the Hawkins Automobile Company, thirty machines, and the other the Houston Automobile Company, fifty machines. Another garage is being built by Mosehart & Keller, buggy manufacturers and dealers. It will be larger than either of the others, and the firm, it is understood, is to engage in the automobile sales business.

There are three active agencies in the city, as follows: The G. W. Hawkins Automobile Company, handling the Pierce Arrow, Winton, Franklin and Olds; the Houston Motor Car Company, handling the Cadillac and Aperson; J. Wade Cox, handling the Ford.

The automobile business is five years old in Houston, the first agency having been established by G. W. Hawkins. The majority of the machines owned here have been sold in the last two years. In number the Olds has the lead, having been pushed by the first agency.

The outlook for the 1906 business is regarded as most promising by all of the dealers, and they expect a much larger business than they have yet had. The tendency, according to the dealers, is for higher priced machines, or rather for those of high grade.

Foreign News Notes.

A donation of $1,250 has been made by the Automobile Club of Great Britain towards the upkeep of the roads on the Isle of Man, in appreciation of the consideration the club received on the island during the touring trophy contest and on previous occasions.

Measures are on foot in Denmark to remove the present regulations which prohibit automobiling except in Copenhagen and on the chief highways of Denmark during daylight. All roads under parish control are entirely closed to the self-propelled vehicle.

The proposed and postponed English Light Van Trials will not take place in 1906, as in consequence of inquiries made, the A. C. G. B. I. does not think the entries would justify the trouble and time expended.

On February 7 a large motoring dance will be held in Berlin under the auspices of our comic contemporary, *Das Schnauferl*. Several humorous interludes have been arranged, such as a car and boat cake-walk, a "pip-pip" concert, an automobile chamber of horrors and others which will appeal to the automobilists present. The decorations consist of the Herkomer tour route in all its stages from Frankfort over Munich to Vienna and back to Frankfort.

The Scotch Automobile Club has seceded from the A. C. of Great Britain and will seek independent recognition in all automobile countries.

Speedometer and lamp trials will be held in England conjointly with the 4,000-mile tire reliability trials, which have been postponed from February 1 to February 15.

The Ladies' A. C. of Great Britain has fixed the date for its annual gymkhana for June 30, on the Ranelagh Club grounds.

On June 29 the International cup for motorcycles will be run off on the Patzau route in South Bohemia, as Austria carried off the trophy in France last year.

The proposed German automobile tax of 100 to 150 marks ($5 to $7.50) regardless of the initial value of the car, is causing grave disturbances in German circles. All automobilists are being called upon to meet and discuss measures to avoid, or at any rate enlighten, the threatened burden, which will mean financial ruin to factories building only light cars. It may not be known that the regulations propose to give foreigners a free stay of thirty days in the empire with their cars. Should this period be transgressed, say because of sickness or a breakdown, the car-owner is not only liable to pay the full tax, but a fine as well. If this measure passes, Germany will soon be sharing the fate of Switzerland, which is now being boycotted by tourists.

Meeting to Discuss Jersey Auto Bill.

PHILADELPHIA, Jan. 22.—A hurry call issued by President Starr, of the Automobile Club of Philadelphia, and President Smith, of the Philadelphia Automobile Dealers' Association, to-day resulted in a big meeting of the members of those organizations to discuss the Frelinghuysen automobile bill, which was introduced into the New Jersey Legislature at Trenton this afternoon.

The meeting was called at the instance of W. F. Sadler, who is chairman of the Law Committee of the Associated Automobile Clubs of New Jersey, and was held in his office in the Pennsylvania building. Mr. Sadler took up the bill section by section and explained the meaning of any involved clauses, devoting especial attention to the more drastic provisions. In his opinion the bill, if it becomes a law, will drive automobilists from the state. Not only will it drive out factories, in which more than $10,000,000 is invested, but the treasury will lose the license fees of many of the 15,000 automobilists who now hold such permits.

After a threshing out of the subject it was unanimously decided to send a delegation to Trenton to protest against the measure. It was also decided to ask the Automobile Club of America and the New York state clubs to join in the movement.

Some of the more radical provisions of the bill are those which call for the appointment of special automobile detectives; an annual registration fee of 50 cents per horsepower for vehicles and 25 cents per horsepower for drivers; "short-time tourist registration" at $1 per day; the limiting of the number of cars to be run under a manufacturer's registration to five, and the period for which a person can have a dealer's machine on the latter's registration to five days; the attachment of the driver's photograph to his license; a speed limit of a mile in seven minutes in cities and towns and a mile in three minutes elsewhere, supplemented by the provision that "no speed regulations shall be held to relieve any driver of the consequences of his negligence;" power to arrest offenders without warrant; a fine, on conviction, of not more than $500 and imprisonment in the county jail for not more than sixty days; permitting any magistrate to revoke a driver's license.

Mr. Sadler said the horsepower registration fee would net the state $150,000 annually.

A NEW L'HOMMEDIEU BILL.

ALBANY, Jan. 22.—A new auto tax bill will be introduced and pressed in the legislature this year, and if it is perfected to meet the views of the owners of automobiles, will stand a good chance of becoming a law. Senator L'Hommedieu, of Orleans County, who had a crudely constructed tax bill last year, will introduce the measure at this session, perhaps this week.

It will impose an annual tax of $1 per horsepower on all motor vehicles, save possibly those employed in business, such as trucking or the delivery of merchandise and those of manufacturers' stocks. A revenue approximating $400,000 a year is anticipated. Senator L'Hommedieu has talked his bill over with the Governor's legal adviser, Cuthbert W. Pound, relative to the constitutionality of such a measure and has no doubt that it will stand the test of any court procedure.

TAX FOR STREET PAVING.

Plan to Tax Autos to Help Pave Baltimore Streets.

BALTIMORE, Jan. 20.—Last summer Mayor Timanus, of this city, and J. Spencer Clarke, collector of water rents and licenses, suggested a plan whereby the municipality might increase its revenues by the imposition of a city tax on private automobiles, the idea being to assess them $1 for every 10-horsepower. Automobilists protested vigorously against the scheme and it was submitted to City Solicitor Bruce, who, after due consideration, declared that it would be unconstitutional.

It seems, however, that the matter was not entirely given up and it has once more cropped out, this time with private horse-drawn vehicles included. Mayor Timanus has appointed a committee, composed of Major Shirley, engineer of the topographical survey, J. Spencer Clarke and Judge Conway W. Sams, to look after the preparation of a bill which will be introduced during the present session of the legislature. It makes no reference to the amount of the proposed tax or license, merely asking that the mayor and city council be empowered to pass the necessary ordinance and to determine the details. It is known, however, from statements by Mr. Clarke, that if the measure is adopted a uniform rate of $10 will be charged all motor vehicles, while $2 will be the assessment for a single horse team and $4 for a double team.

The basis of the whole scheme is the belief of Mr. Clarke and his colleagues that by this system of taxation the debt and interest on a $5,000,000 loan—to be floated—can be paid in thirty years by the revenue from the tax. The result, they hold, will be the best paved city in the United States and one of the greatest automobile centers in the world. The plan also includes the abolishment of license numbers on cars, the method of registry to be decided upon by the city council. So far as is known the scheme applies only to Baltimore and not to any other city or town in the state, and the improvement of roads will be confined to the district within the city limits.

The Automobile Club of Maryland some time ago announced that it would use every effort to prevent the passage of the measure and it is expected that it will be contested when it reaches the House of Representatives at Annapolis.

A CONTRAST IN SHOWS.

Megargel Compares the Transcontinental Exhibition with New York Affairs.

BLUE WATER, New Mexico, Jan. 16.—While New York's fashionable society is crowded around the exhibits at Madison Square Garden and the Sixty-ninth Regiment Armory, gazing with admiration at the latest styles of automobiles exhibited by the leading manufacturers of this country and Europe, an entirely different scene is being enacted in eastern New Mexico—yet it is an automobile exhibition that is attracting almost as much attention in this section as are the New York shows in the East. Instead of the mingling of men in tuxedos and opera hats, and beautifully gowned women, as in New York, the spectators here are Mexicans, Indians and cowboys, and instead of moving through crowded aisles, examining first one machine and then another, their entire attention is centered on one little mud-covered, travel-scarred automobile, the first to cross New Mexico and the first to attempt a double transcontinental or a winter automobile trip across the continent.

The remarks one hears are very different from those one heard in the Garden or the Armory. Instead of such remarks as: "Have you seen the new six-cylinder ——?" or "the handsome —— limousine," or "the clutch on the —— car?" we hear something like this: "Heap big devil wagon; goes without pony;" "How'll you swap that fire-eater for my bronc, stranger?" and "Say, stranger, I don't see no brand on that critter. What is it, a maverick?" Every part of the machine is given the most critical attention; teachers give their school children a holiday while the car is in town, and the Navajo, Pueblo, and even the fierce Apache Indians slink around the corner when the engine is cranked and the open muffler shoots out flashes of fire with a noise greater than that made by the Colts forty-five.

The run of the *Mountaineer* for an entire week registers only about one hundred miles, but every foot of that distance has been gained only after the hardest kind of work in the adobe mud for which New Mexico is famous. This soil clings to the wheels of vehicles until the natives refuse to use wagons during the wet season, doing all their transportation on pack animals. Even these frequently become so hopelessly mired that they are lost. "Dobe" mud is so sticky that the trail made by our auto can be readily followed for a distance of 150 miles, the wheel tracks resembling two plowed furrows. This mud, however, has its value, for out of it are made the sun-dried bricks from which nearly all the houses in the state are built.

At Gallup two automobiles are owned by

Charles Cotton, son of a wealthy Indian trader, whose trading posts dot the surrounding counties. At Albuquerque, the next large town to be visited by the *Mountaineer*, are numerous automobiles, while machines are owned at Williams, Winslow and Flagstaff, Arizona.

Just which is the worst traveling, mud or snow, is hard to decide, but from our experiences through Arizona and one hundred odd miles in New Mexico, we prefer snow to the mud, even if the water pipes do freeze occasionally and the crew is obliged to bundle up in all available clothing to keep from freezing. Tire chains and tires with studded treads are the only thing in the tire line that will enable us to get traction, and even with all of this equipment the rear wheels spin around and around in the mud.

PERCY F. MEGARGEL.

CINCINNATI MUNICIPAL AUTOS.

CINCINNATI, Jan. 22.—This city expects to use automobiles in three branches of public service—the post-office, street cleaning department and the patrol service. After an investigation of the methods of hauling mail by wagons, it is authentically declared that the Government will install about a dozen automobiles. Already bids are being taken for a patrol for the police department. If this is proved successful, several more will be ordered.

The Board of Public Service will furnish the district superintendents in the Street Cleaning Department with autos to make their rounds. Automobiles will also be utilized for the collection and removal of ashes.

The use of automobile ash carts will be watched with interest, as it is declared by certain persons here that such machines will not prove practical. It is pointed out that the ash trucks will not merely have to run on paved streets, but into the dump ground, and that in wet weather these dumps are as bad as quagmires.

AN AUTOMOBILE ICE BOAT.

TOLEDO, O., Jan. 22.—The fact that there has been no ice in the Maumee river or on Lake Erie this winter is the only reason why Commodore F. M. Underwood, of this city, has not given his new automobile ice boat, *Toledo No. 2*, a trial. Last winter Mr. Underwood ran such a boat on the Maumee river at the rate of forty miles an hour, but his new boat, which has a number of improvements, is geared to eighty miles an hour, and by simply changing a sprocket wheel, can, it is claimed, be made to cover the ice at the rate of 100 miles an hour.

The new boat has two propelling wheels near the front end fitted with sharp teeth which take hold of the ice or snow. They do not support the body, which rests on a pair of broad runners. The driver's seat is well toward the rear, where a wheel steering apparatus controls a rudder plate or blade resting on the ice. Motive power is derived from a four-cylinder 8-horsepower gasoline engine. The boat is fourteen feet long and is five feet eight inches wide.

GERMAN CLUB CHANGES NAME.

No little sensation has been caused by the announcement of the German Automobile Club that in consequence of the acceptance of the patronage by the German Emperor, the name of the club has been changed to the stately title of the Imperial Automobile Club. Furthermore, the Emperor is having a new club badge designed by a prominent artist, and will bestow it on the I. A. C. as a membership taken under the new name.

The new allegiance between the monarch and the leading German club is only a natural outcome of the interest the Emperor has evinced for automobiling and which actually dates from the Gordon-Bennet race of 1904, when Emperor William was a delighted spectator on the Taunus course he personally had chosen.

NEWS NOTES OF THE CLUBS.

CHICAGO.—The Austin A. C. held its annual election last Tuesday. The following men will serve for the coming year: J. H. Francis, president; C. E. Ingalls, first vice-president; J. E. Plew, second vice-president; C. E. Westwood, secretary; J. S. Wayman, treasurer; J. E. Redmond, attorney; M. B. McBirney, surgeon. The club passed resolutions at the meeting to uphold the laws which govern the speed of automobiles.

CINCINNATI, Jan. 22.—The Cincinnati Automobile Club is making preparations to hold races on straight roads next summer and to organize a number of hill-climbing contests. Entries will be prepared in a few weeks. Already fifteen silver trophy cups have been secured for prizes.

MUSKEGON, MICH.—The Muskegon Motorcycle Club gave a banquet and smoker to the representatives of the press of that city on January 12. The good roads question was discussed in all its phases and a project launched for a new clubhouse.

BUFFALO, Jan. 20.—The annual meeting and election of the Buffalo Launch Club was held Friday night in the Builders' Exchange. The result of the election was as follows: Commodore, A. E. Hubbard, M.D.; vice-commodore, A. F. Dohn; fleet captain, Frank L. Dunbar; secretary, Roger F. Williams; treasurer, Frank X. Argus, Jr.; directors, John W. Ashley, Frank J. Gunnell, George B. Eggbert, Fred Metcalfe. Al F. Dohn and Frank A. Argus were selected as delegates to the meeting of the American Power Boat Association to be held in New York in March. The question of the location of a new clubhouse was left in the hands of a committee. Several sites are now under consideration.

An acetylene lamp should burn silently. A burner that hisses is wasting gas, giving a reduced light and making smoke.

NEW CHICAGO AGENCIES.

CHICAGO, Jan. 19.—The Michigan Avenue Automobile row will see some more changes and additions in the near future. New agencies continue to open quarters while there is no prospect of any old ones removing. This city is rapidly becoming one of the great automobile centers in the world.

One of the new comers is the Cassidy & Fairbank Company, which has closed arrangements with the Cleveland Motor Car Company to act as its agent in Chicago. The new company will have its headquarters on Michigan avenue between Fourteenth and Fifteenth streets; H. J. Cassidy, formerly in the bicycle business, and Dexter Fairbank are the principals in the firm.

The Rainier Company will establish a branch in the city next week, E. Q. Cordner assuming the management with headquarters at 1539 Michigan avenue. S. E. Comstock, who was formerly with T. B. Jeffery & Son, will assist him.

The Lozier Motor Company will open an agency in Chicago in February.

Jerome A. Ellis, a director of the Chicago Automobile Club, is to engage in the business in the near future, handling the Frayer-Miller car. After May 1 his company will occupy the building which the Bennett-Bird Company now leases at 1404-1406 Michigan avenue. Harry N. Taylor, a coal dealer in Chicago, will be associated with Mr. Ellis.

RECENT INCORPORATIONS.

Michelin Products Selling Company, New York (motor cars and appliances); capital, $100,000. Directors: W. F. Donovan, P. W. Logan, F. P. Reilly.

The West Side Motor Car Company, Hamilton, O.; capital, $10,000. Incorporators: John E., C. A., Charles C. and K. C. Schmitt, D. Clarence Murphy.

The Hol-Tan Company, Glen Cove, N. Y.; to deal in motor vehicles; capital, $100,000. Directors: G. P. Tangeman, E. R. Hollander and C. H. Tangeman.

The White Automobile Company, Columbus, O.; capital, $10,000. Incorporators: C. M. Taylor, H. F. Kruger, W. P. English, C. E. Yoder and J. B. McCaughy.

The Palmer Automobile Manufacturing Company, Ashtabula, O.; capital, $50,000. Incorporators: Richard Conrad, A. P. Fisk, C. W. Savage, H. Beeder and J. J. Farrell.

The Matheson Company of New York, Huntington, N. Y.; to deal in motor vehicles; capital, $100,000. Directors: Henry U. and A. P. Palmer, Charles A. Singer and Charles A. Singer, Jr.

Philadelphia Portable Store Company, Camden, N. J.; capital, $150,000. Incorporators: H. A. Illman, Frank L. Richardson and Wilfred B. Wolcott. The object of the concern is the selling at retail of general merchandise from huge motor wagons fitted up especially for the purpose.

News and Trade Miscellany.

The announcement from Columbns that an appropriation of $500,000 for this year and $1,000,000 for next year has been asked of the legislature by the Ohio Good Roads Association has caused considerable satisfaction to local automobilists. Val Duttenhofer, president of the Cincinnati Automobile Club, attended the good roads convention in Columbus, as a delegate.

Delaware was well represented at the automobile shows in New York City, and some Wilmingtonians who were there were so favorably impressed that they talked of having an automobile show in Wilmington. About 100 machines are in use in the city and as they are of almost as many makes, and as there are several agencies and garages there, it is believed that an exhibition of the kind would prove of interest and stimulate the business.

Plans for a third new garage for Toledo, are now being drawn. It is to be erected in the residence portion of the city by L. L. Blood. The proposed building is to be 50 by 100 feet in size and is to be fitted up to take care of automobiles in the most approved way. The automobile business in Toledo is improving rapidly and all the local dealers are receiving numerous inquiries regarding machines for the coming season, which promises to eclipse 1905 as far as 1905 eclipsed 1904.

Plans have been completed for the erection of a three-story garage in Cincinnati, on Sycamore street, near Sixth, by a combination of automobile owners, who declare that garage charges in that city are excessive. The garage will be modeled after those in Eastern cities. The cost of conducting it will be derived from the rental of exhibition spaces, which will be let to local representatives of automobile manufacturers. The building will include a repair shop. It is asserted that fifty automobilists are interested in the venture.

A number of Chicago autoists joined the special train from Minneapolis and St. Paul for Ormond last Sunday, and left for the Daytona races over the Big Four. Among those in the party are: President Henry Austin, of the Oak Park Automobile Club, and wife, Webb Jay, F. W. Douglass and others.

For two weeks prior to the recent opening of the Indiana theatre in Indianapolis, a big touring car was driven through the streets of the city daily, bearing announcements of the opening of the new theatre. The management claims that the scheme brought better results than was anticipated.

Students of the Shortridge High School Science Department, in Indianapolis, are taking special interest in the study of automobile construction. Last week about forty of the students, under a teacher, visited the plant of the Pope Motor Car Company, paying particular attention to the use of storage batteries as applied to automobiles. It is said that other factories in the city will be visited by the class.

The new salesroom of the Foss-Hughes Motor Car Company, at the northeast corner of Broad and Race streets, Philadelphia, was opened to the public on Monday. Flowers and music added to the interest of the display, which included several of the cars which were in the New York show exhibits of the Pierce-Arrow, Cadillac and Baker Electric concerns, of which the Foss-Hughes Company is the local representative. The Quaker City Automobile Company (Franklin, Oldsmobile and the Pope line) and the Hamilton Auto Company (Stoddard, Dayton and Corbin) are having similar individual shows.

The discovery of a tire lever inside of a tire by Dr. A. C. Helm at Milwaukee, has caused no little comment at the Diamond factory. The tire was a Diamond, and the lever had been between the tube and the case for six months without being noticed. The piece of steel is twelve inches long, an eighth of an inch thick and an inch wide. It developed that Dr. Helm's machinist dropped the lever in by mistake when putting the tire on.

J. D. Hawks, president of the Detroit & Mackinac Railroad, has offered to further the good roads movement in Michigan by delivering along the right of way of the railroad at any crossing gravel enough to build fifteen miles of highway. The delivery will be made without cost to the township other than the actual cost of the material. The road will probably be built in Arenac county.

The Decauville Automobile Company, of New York, after considerable delay, has moved into its new garage at Fifty-sixth street and Broadway, and the three establishments formerly maintained at Thirty-eighth street, Thirty-ninth street and on Broadway have been concentrated under one roof.

W. Gould Brokaw has ordered from Audineau & Co., the Parisian body builders, an enclosed body of unique character to be placed on a 50-horsepower Fiat chassis. The car will be a sort of "cruiser" and will have seats which can be made into a berth for sleeping; there will be a washstand and complete toilet fittings, an ice-box, provision storage, electric lights and numerous other conveniences, so that a small party can indulge in long "land cruises" without having recourse to hotels.

The "Ultra" compound tire pump, heretofore manufactured by the Ultra Pump & Power Company, of Auburn, N. Y., is now being made by the Bridgeport Brass Company, of Bridgeport, Conn. The change has been made because the original manufacturers, who are the owners of the patents, had not the facilities necessary to meet the increasing demand and cast about for means to enable them to place the pump on the market in larger quantities. The name of the pump has been changed to the "Deno." The trade will be supplied by the Bridgeport Company, while the Ultra Company will attend to individual orders. It is stated that the Bridgeport Brass Company subjected the pump to thorough tests before undertaking its manufacture.

The Matheson Motor Car Company, Holyoke, Mass., announces the establishment of a New York agency at 1619 Broadway, as temporary quarters until the completion of a garage, which is to be erected at an approximate cost of $500,000, the site of which has not yet been determined. The entire output of the company has been sold to a selling agency which will be known as the Matheson Company, of New York, the principals in which are Charles A. Singer, of New York, and Henry U. Palmer, of Brooklyn.

Agencies for the Queen and Mitchell cars for 1906 have been placed with the D. B. Sullivan Auto Company in Indianapolis. The company had the agency for the Queen last year, while the Mitchell had no special representative in the city.

A company for the manufacture of auto chimes has been organized in Indianapolis. It will be known as the Auto Chimes Company and will be managed by D. B. Sullivan, who is also manager of the D. B. Sullivan Auto Company. The chimes are of square tubing bolted and riveted together. Funnel-shaped distributing castings are used and it is said that a man can blow the horn with his breath. A three-way butterfly valve of an improved type controls the pressure, which does away with back pressure on the engine while the chimes are being blown.

M. Rothschild, the American member of the firm of Audineau et Cie, has made the announcement that, on March 1 he will open a factory in New York, where the bodies built in France will be finished for the importers who are sending him hurry orders and for several prominent American manufacturers who desire Audineau bodies for their high-powered chassis. This finishing factory in New York will be run under the supervision of a Parisian superintendent, educated in the Audineau ways and styles.

The Cuban consul at Philadelphia, has been instructed by his home government to announce to those contemplating visiting Havana at the time of the automobile races there that all traces of yellow fever have been eradicated and that Cuba is free from all contagious diseases.

The National Auto School, at Carlisle and Oxford streets, Philadelphia, has just opened with large classes under the instruction of Manager J. Frey and a corps of experts.

The last toll-house within the limits of Philadelphia county was wiped out last week when the local rapid transit company paid to the Cheltenham & Miller Grove Turnpike Company $20,000 damages for the discontinuation of all toll-gates on the old York road from Erie avenue to the city line.

Recently elected officers of the Professional Chauffeurs' Club of America, effective for 1906, are W. H. Walter, president; Fred. Brevogel, first vice-president; C. Schmidt, second vice-president; Emile Stricker, treasurer; F. N. Walch, recording secretary; M. J. McGuire, corresponding secretary.

Fred I. Tone, who was until recently connected with the Marion Motor Car Company, is now general manager of the American Motor Car Company, Indianapolis, Ind.

"Seeing Salt Lake City in an automobile" has been made possible by the Auto Sight Seeing Company, of which L. C. Snow is general manager. The company has mapped out a route covering the places of interest in the city, a distance of almost twenty miles, and a charge of $1.00 per passenger is made.

Among the visitors to the two shows last Thursday was J. W. Thompson, who first drove a Locomobile in Japan. He came home from the Flowery Kingdom only three weeks ago, and when he returns next fall he will take with him a 30-35-horsepower Locomobile, which he bought in the Garden. Mr. Thompson says that automobiling has made comparatively little progress in Japan, although the roads are well adapted for motoring. He ascribes this apparent backwardness to the large import duty, and believes that when this is removed or modified American machines will find Japan an excellent market.